Coal Age

MAY, 1946

MINING EFFICIENCY NUMBER

Presenting the Coal Mining "Know How" Developed by the "Coal-for-Victory" Award Winners

Here's what "JOB-PROVED" Sun Mine Lubricants did for "C-V" Award Winners

CONVEYORS...
cut costs... simplified lubrication.

MINE CARS...
no bearing failures... grease lasts longer.

In many of the mines where the 1945 "C-V" awards have been given for increased production, overall efficiency, and mining "know-how," Sun "Job-Proved" oils and greases and Sun Engineers are lending a helping hand.

Sun mine lubricants have proved their quality on the job in years of hard service. In cars, locomotives, loaders, conveyors . . . in main power plants . . . in every type of mining equipment . . . Sun products stop dangerous metal-to-metal contact, prevent excess wear, keep machines going without costly, unexpected shutdowns.

For higher production in 1946 . . . plus lower operating and maintenance costs all along the line . . . call in the Sun Engineers near you and take full advantage of their experience with Sun's "Job-Proved" products for the coal industry.

SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

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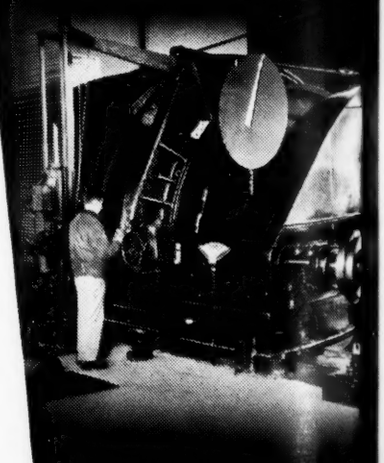
SUNOCO
INDUSTRIAL PRODUCTS

MINING MACHINES...
9 years with no lubrication trouble.



HOIST...
maintenance redu
50% less lubricati

Two-way traction tire has new kind of bruise-resisting construction

Rock and dirt hauling, especially in wet weather, used to cause a lot of tire headaches. Heavy loads strained the tire body. Severe grades increased traction and slippage problems. Rocky terrain made tire life worse—for when tires hit rocks, ruts, etc., under load, the walloping blows led to bruises, ply separation, and blow-outs. Costly delays and repairs resulted.

B. F. Goodrich engineers took over the headaches. They designed a new tread with thick, heavy lugs—but designed it so that the natural running action pushed mud and dirt toward the edges. The tire stayed clean. It gave excellent traction and protection against side slippage. And—it gave equal traction in *either* direction.

Then the engineers developed an entirely new construction principle—the *shock shield.* This shock shield is a set of four breakers—layers of rubber-coated rayon cords—built in between the tread and the plies. These breakers are in pairs, with the cords in each pair running parallel to each other—but with each pair running in opposite directions to give balanced strength. The breakers are cushioned with thick layers of special shock-resistant rubber.

Under impact, the cords in the breakers stretch together, *not* across each other, and return to their original position. The blow is *distributed* and *absorbed* by the rubber cushions; the shock passed on to the cord body is greatly reduced.

This tire is called The Universal (shown above on truck in foreground). Users report fewer bruises, lower repair bills, longer wear, and that more tires can be retreaded. One operator's records show an average of over 4000 hours from B. F. Goodrich tires built this new way, compared to 1600 hours from another make. Others report similar savings.

You can save with B. F. Goodrich off-the-road tires—tires built to meet *your* needs. Find out more about them. See the B. F. Goodrich dealer, or write us direct. *The B. F. Goodrich Company, Akron, Ohio.*

Truck Tires BY

B.F. Goodrich

"FIRST IN THEIR FIELD"

This Tribute to the mines earning the "Coal for Victory" Award . . . is a tribute to the high production made possible by smooth-running equipment correctly lubricated with . . .

"FIRST IN ITS FIELD"

Hulburt

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GREASE®

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Specialists in Coal Mine Lubrication

PHILADELPHIA, PENNA.

Efficiency in Coal Preparation Means Cleaner Coal with Less Losses of Good Coal in the Washer Rejects

Actual Operation Records show The Chance Process to be the Most Efficient of All Bituminous Coal Washers now in Commercial Use.

Repeat Orders for The Chance Process have been numerous attesting to its Value and Efficiency in Coal Preparation Plants.

THE HEART OF THE PREPARATION PLANT

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"Monobel" AA helps get more coal out... *faster*

Typical large lump produced by "Monobel" AA in West Virginia mine. Note the loader at right operating at peak efficiency.

MINERS like "Monobel" AA. It helps them get out more and better coal ... and do it faster.

"Monobel" AA piles large lump coal where loaders can pick it up easily and quickly. And because it is a powerful, water-resistant permissible, it doesn't shatter the coal, and produces large, firm lump. It assures a large percentage of recovery with less wear and tear on equipment.

"Monobel" AA performs at top efficiency in wet or dry work. It is particularly suited for high, hard-shooting coal, whether top or bottom cut, and is often used in rock or slate. It sheers ribs and face clean and square. Frequently it replaces a combination of two or three other permissibles. Fumes are Class A ... allowing minimum interruption at the face.

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...THROUGH CHEMISTRY

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WILMINGTON 98, DELAWARE

HOW TO DRY FINE COAL

without screens and without shutdowns

The *Bird Centrifugal Filter* separates the clean coal containing all the fines, just as they come, without pre-screening. The Bird teams up with any or all coal cleaning methods, permitting the most efficient cleaning system regardless of dilution. The water is ready for immediate re-use.

Coal discharge, when handling $-\frac{1}{4} + 0$ feed containing 6 to 8% −200 mesh fines, carries not more than 5% surface moisture.

One Bird Filter turns out 40 or more tons per hour. It operates continuously for months without a shutdown for repairs or replacements. Overall costs are low.

Let us give you detailed information on what the Bird Filter does and how it works. Write Bird Machine Company, South Walpole, Mass.

The BIRD Continuous Centrifugal FILTER

Step-Up Coal Output

WITH ALLIS-CHALMERS MACHINE EFFICIENCY!

NO LONGER IS IT TRUE that equipment — plus the power to run it — plus manpower — equals big coal production. Today even more is needed. The factor of higher efficiencies must be added to the production process if coal operation is to be profitable. That's where Allis-Chalmers can help you . . . with cost-cutting mechanization!

From long experience in building equipment for the coal industry, Allis-Chalmers knows how to team efficiency and equipment together to best advantage . . . can materially help you step up production to new tonnage records. Because Allis-Chalmers builds a wide range of basic processing machinery *and* a complete line of power and auxiliary equipment for coal, its recommendations are unbiased, engineering responsibility rests solidly with one manufacturer. For practical, *usable* help, call nearby A-C office or write, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

Basic Coal Processing Equipment

Speed up coal dewatering . . . save space, money . . . with the modern A-C Low-Head Vibrating Screen, with end-tensioned deck. The compact Low-Head fits into much smaller space because it operates horizontally . . . saves installation and remodeling costs.

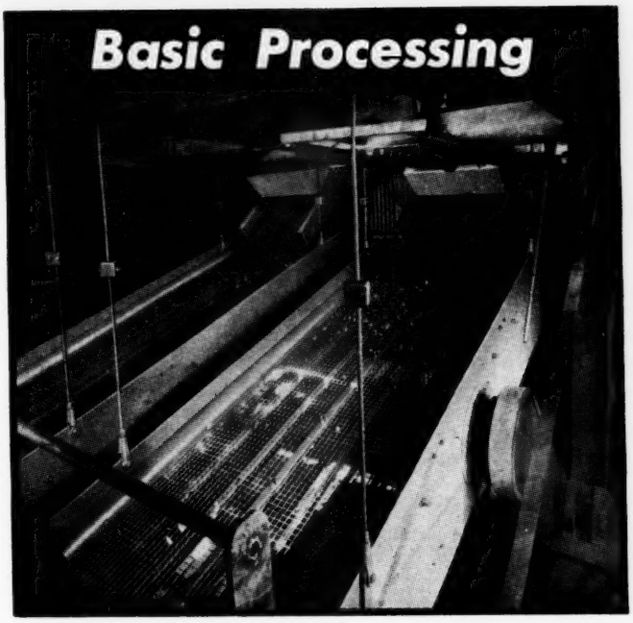
New end-tensioned deck—used extensively in the sink-float process —is an improvement that tensions screens longitudinally instead of horizontally. This results in a more uniform bed depth of coal on screen . . . in maximum utilization of screening area . . . in higher capacity and *better dewatering efficiency*. And screen surfaces can be reversed to double screen life!

Most important feature of the Low-Head Screen is the rugged strength that A-C builds into every part. It can resist vibration stress year after year . . . because all welded parts are *"stress-relieved"*, making entire structure uniformly strong. Vibrating mechanism is totally enclosed. Sizes: 3 x 6 to 6 x 16 ft. With 1, 2, or 3 decks. **Send for Bulletins B6330 and B6321A.**

ALLIS-CHALMERS

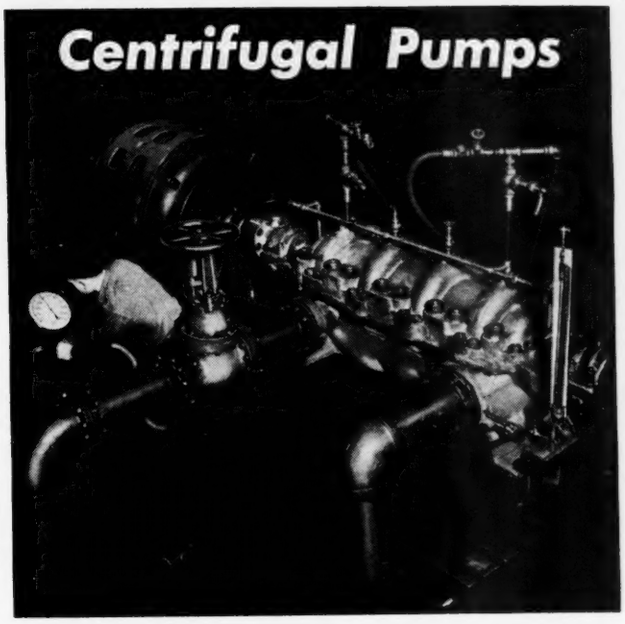
One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

Basic Processing



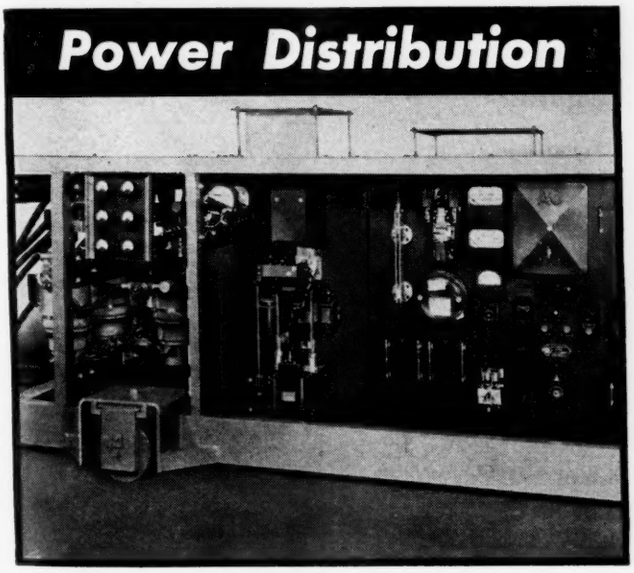
For run-of-mine coal, reduce your screening costs, step up output, with Ripl-Flo, the vibrating screen with the perfect circle throw. As in the Low-Head, all Ripl-Flo welded parts are "stress-relieved" for *uniform, lasting* strength. Every Ripl-Flo is tested before shipment for throw, balance, bearing temperatures. Only *two* bearings to lubricate instead of four! Screen surfaces quickly changed or tensioned by means of convenient clamping plates. Sizes: 3 x 6 to 6 x 16 ft. **Bulletin B6151B.**

Centrifugal Pumps



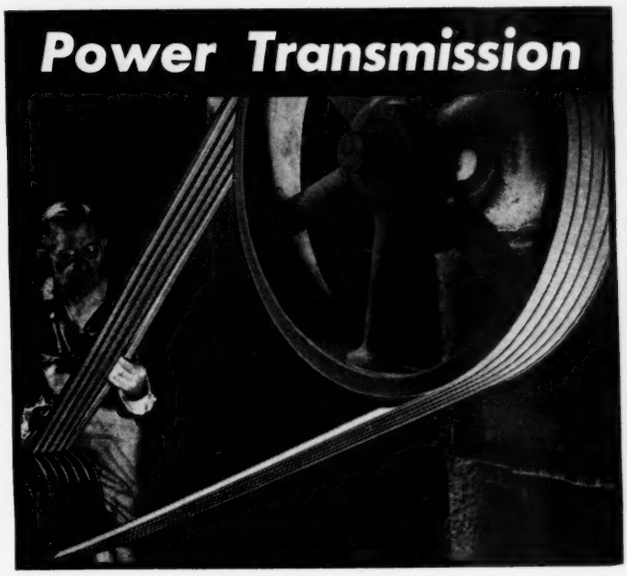
Need mine dewatering capacity? This A-C Type "MI" four-stage pump has capacity of 2100 gpm and 720 ft. head . . . is built for continuous operation . . . long service. Impellers are of the double suction enclosed type . . . are made of acid-resisting bronze, as are all pump parts coming in contact with liquid. A-C construction principle results in maximum regain of pressure between stages . . . *greater pumping capacity per hp demand!*

Power Distribution



Power where you want it is provided by the Allis-Chalmers 3-car Excitron mobile mine unit substation. Efficient a-c to d-c power conversion *boosts* face voltage . . . results in increased coal production and substantially reduced power costs. Flexible, all-automatic d-c power at load centers saves copper and current, provides much better power service continuity. It's both safe and simple to operate — control panel is shown on d-c car, above. Wheels can be easily adjusted to any track gauge. Excitron ratings are 200, 300, 400, and 500 Kw. Get complete details from your nearby Allis-Chalmers office.

Power Transmission



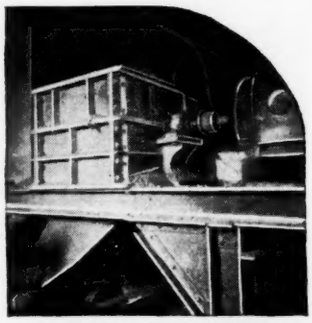
Ventilation is vital to mine modernization. Dependable A-C Texrope V-belt Drives on fans and blowers is a safe, *sure* way to provide ventilation efficiency. Tough Super-7 V-belt Drives resist dust, grit, and moisture . . . are economical and long-lasting. Texrope Drives are made in five types, including the Oil-Proof Super-7 and Static-Resisting Super-7 for coal mines. A-C Vari-Pitch Sheaves and Vari-Pitch Speedchangers make it easy to adjust speeds accurately. Cut power transmission costs—get A-C engineering advice on Texrope Super-7 Drive installations. Send today for **Bulletin B6051D.** A 2049

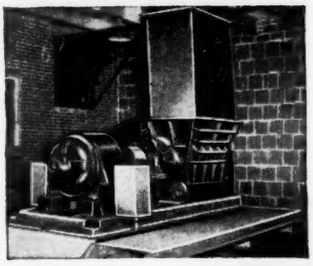
HEAR THE BOSTON "POPS": *Every Saturday Evening, American Broadcasting Co.*

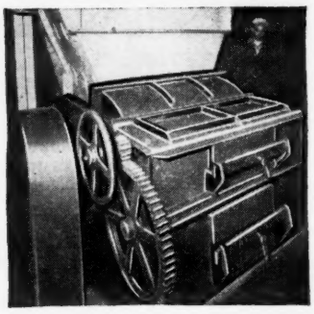
. . . builds for COAL

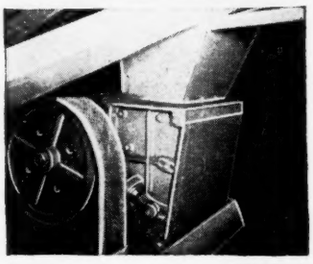
WHEREVER THERE ARE PRODUCTION WINNERS

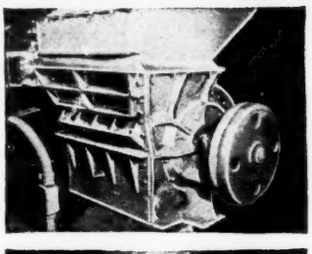
you'll find American Crushers, too

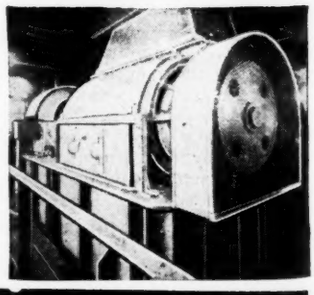












Congratulations to the hardworking mines of America especially to those given "COAL-FOR-VICTORY" Awards ---among them were these outstanding producers equipped with American Crushers.

- Chicago, Wilmington & Franklin Coal Co. West Frankfort, Ill.
- Chicago, Wilmington & Franklin Coal Co. Orient, Ill.
- Forsyth Carterville Coal Co. Carterville, Ill.
- Franklin County Coal Corp. Herrin, Ill.
- Franklin County Coal Corp. Royalton, Ill.
- The United Electric Coal Cos. DuQuoin, Ill.
- The Buckeye Coal Co. Nemacolin, Penna.
- Pittsburgh Coal Co. Van Meter, Penna.
- Pittsburgh Coal Co. Sutersville, Penna.
- Island Creek Coal Co. Holden, W. Va.

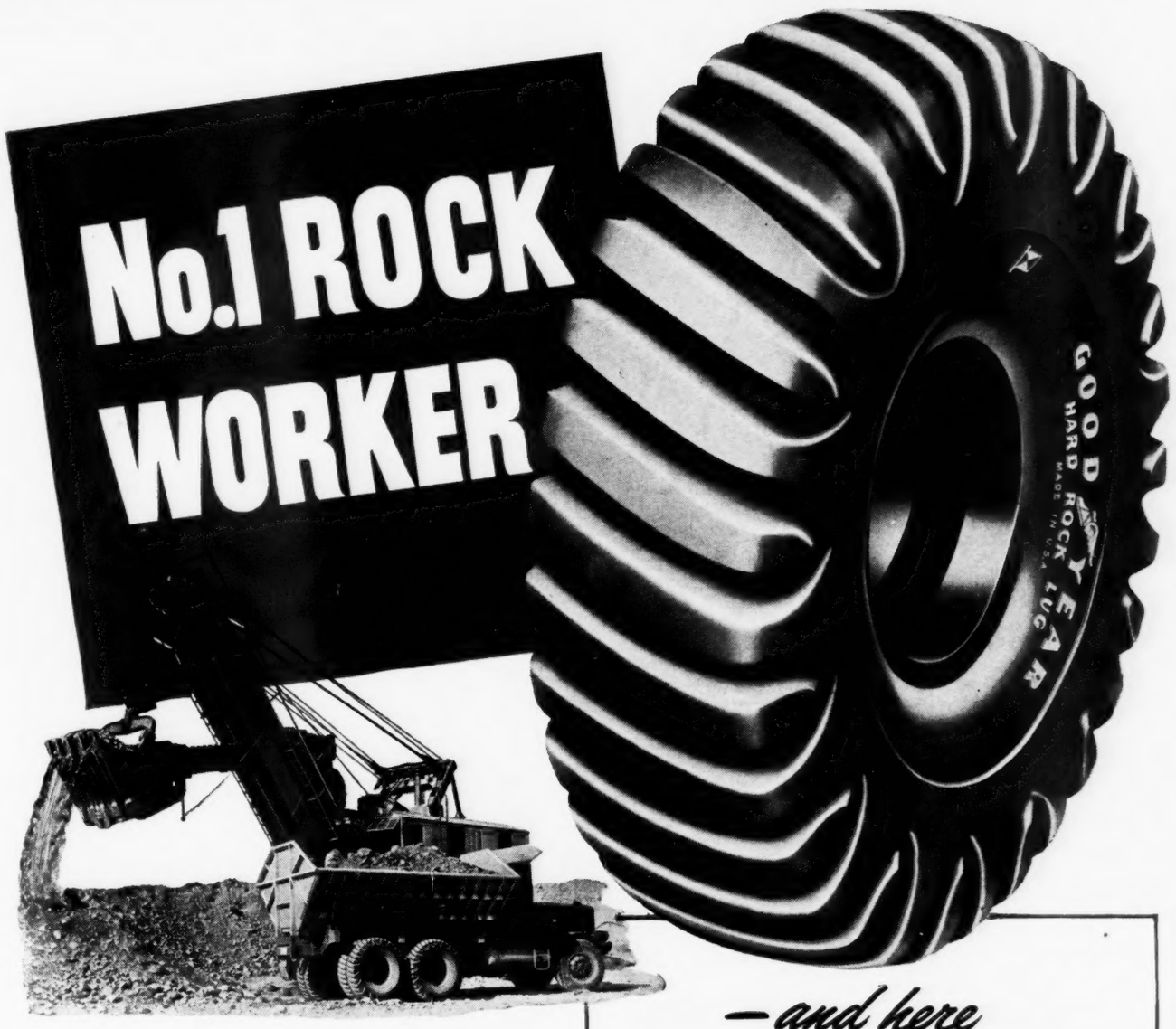
Stepping up production to meet the tremendous war demands for vital fuel was met with great, patriotic effort by the entire coal mining industry. Never did war production suffer because of empty coal bunkers. Mine operators and workers did their jobs creditably. In the important part that equipment played in this war job the American Pulverizer Company appreciates the recognition given in the use of its crushers.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Avenue
St. Louis 10, Mo.

No.1 ROCK WORKER



WHERE the going is tough — where tires must stand the gaff and grind of rough and rocky ground — Goodyear's great Hard Rock Lug tires are first choice year after year. For in mine, quarry, dam-building and other construction work that beats the heart out of ordinary tires, Hard Rock Lugs stand up longer, take it better, and come steadily back for more. Years of standout service prove *that*. And today, for all practical purposes, they are the equal of prewar tires in natural rubber content. That's why you'll be time and money ahead with Hard Rock Lugs on *your* rock-work units.

BUY and SPECIFY GOODYEAR—*it pays!*

—and here are the reasons why:

MASSIVE LUG BARS armor the tread and sidewalls against cutting

SELF-CLEANING TREAD doesn't pack up, bites deeper, pulls better

EXTRA-THICK UNDERTREAD lengthens tire life—protects carcass from bruises

SUPERSTRONG CARCASS of Goodyear's patented Rayotwist Cord—made from rayon—adds more stamina, long life

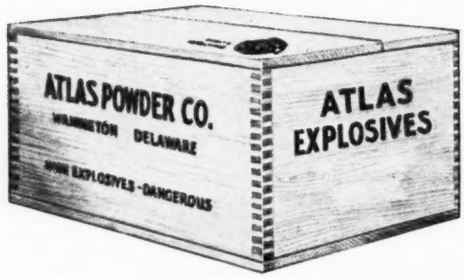
MULTIPLE BEADS of high-tensile steel wire insure non-slip anchorage to rim

Rayotwist—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

MORE YARDS ARE MOVED ON GOODYEAR OFF-THE-ROAD TIRES THAN ON ANY OTHER KIND

A New Kind of Blasting System That Breaks the Rock *But Saves the Coal*



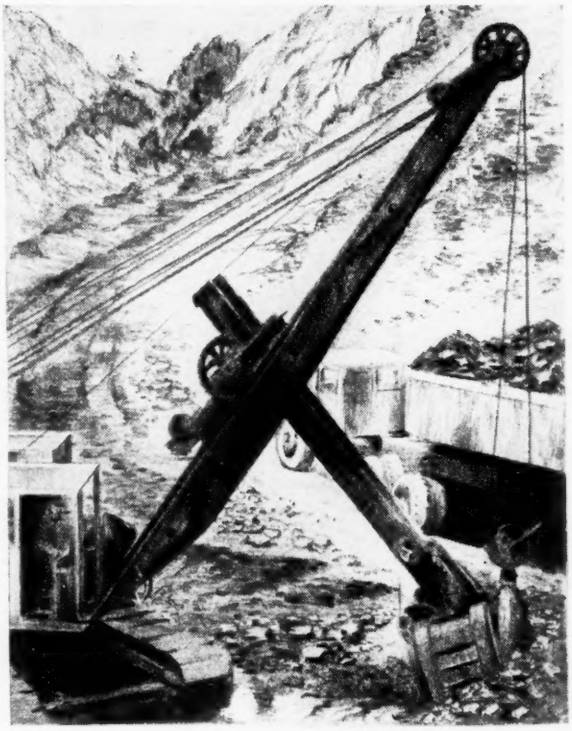
+

ATLAS ROCKMASTER

There's something unique and different in explosives for stripping—*a whole new system of blasting* designed to increase rock fragmentation without harming the coal underneath. The name of this system is the Atlas Rockmaster. It's the first really important blasting development since the war. It also gives you the extra safety of Atlas Manasite Detonators, tried and proved by years of experience in the field.

Built on the delayed-action principle, but with an entirely new method of firing control, Atlas Rockmaster has amazingly increased shovel production in strip pits where it has been used. And it has cut down vibration and concussion, too.

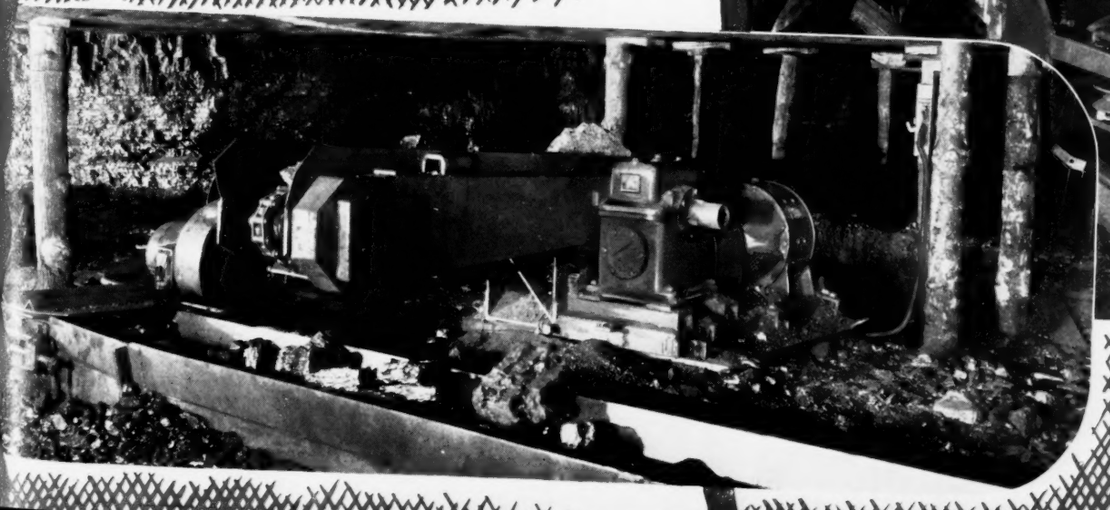
Atlas does not claim the Rockmaster Blasting System to be the answer to *every* coal stripping problem. But it may very likely be the answer to yours. Our Atlas representative will be glad to consult with you, adding his knowledge of Rockmaster to your knowledge of the job, to see what improvements can be worked out together. Likely as not, overburden fragmentation can be substantially bettered—without reduction or damage to the coal itself.



ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*



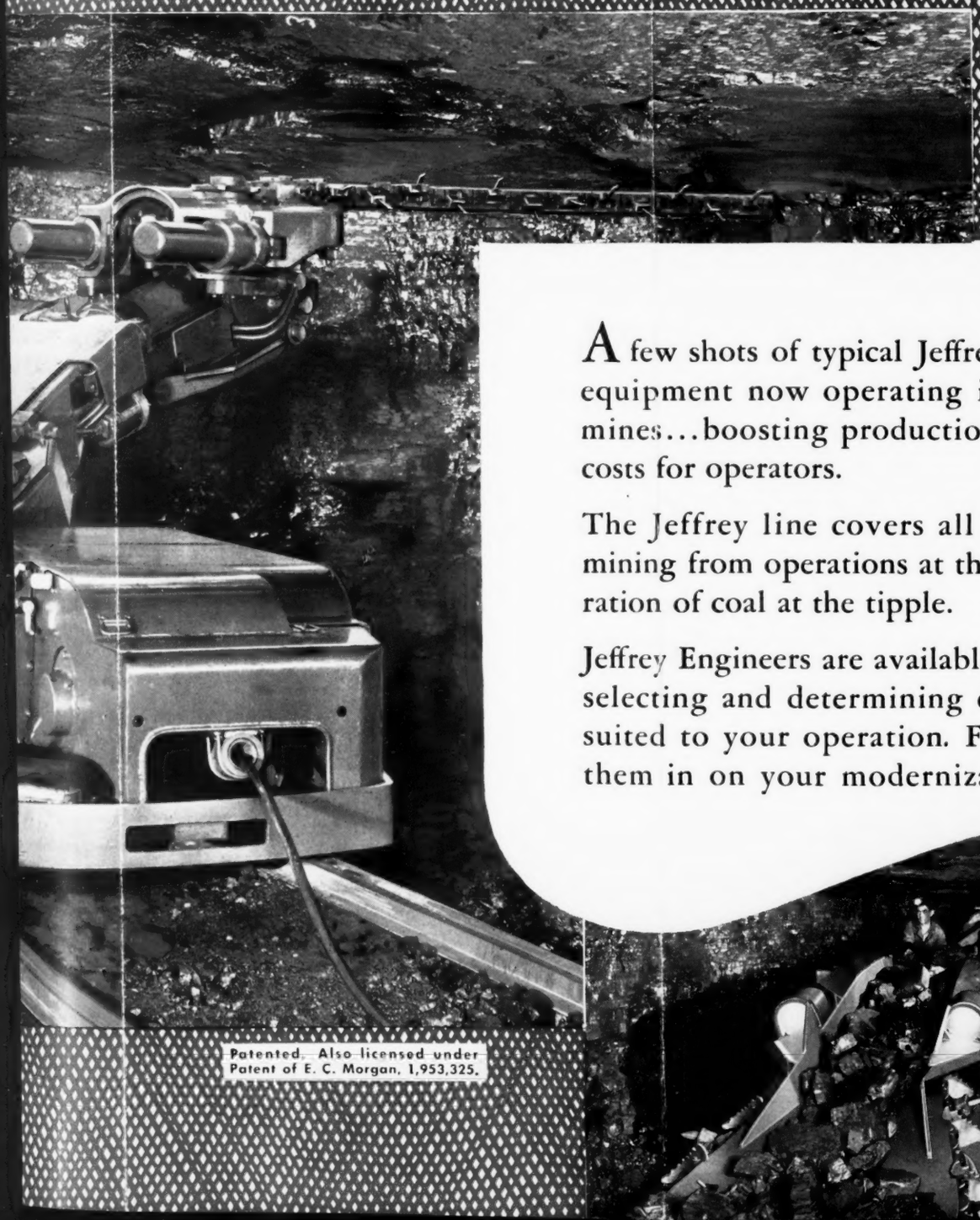
JEFFR

UNDERGRO

Patented. Also lic
Patent of E. C. Morg

FFREY

DERGROUND EQUIPMENT

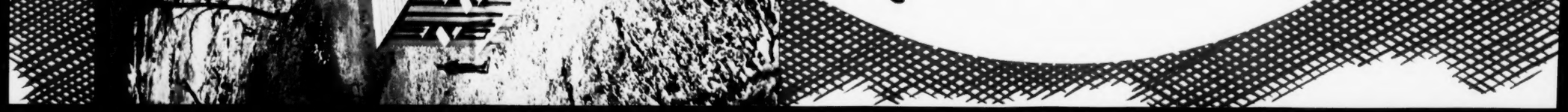


Patented. Also licensed under Patent of E. C. Morgan, 1,953,325.

A few shots of typical Jeffrey underground equipment now operating in hundreds of mines...boosting production and reducing costs for operators.

The Jeffrey line covers all phases of coal mining from operations at the face to preparation of coal at the tipple.

Jeffrey Engineers are available to help you in selecting and determining equipment best suited to your operation. Feel free to call them in on your modernization program.



JEFFREY *Twin* AERODYNE FANS *provide maximum economy and continuous ventilation*

A recent installation shown above consists of two complete fan units. This method is being used more and more when new installations are made. When designed with two separate sources of power, the maximum economy and insurance of continuous ventilation is obtained.

This type of installation, also increases the flexibility of operation which permits varying amounts of air volume to be delivered by operating the fans separately or simultaneously. Each fan is equipped with blades, easily adjustable, which further increases the change that may be obtained in volumes delivered.

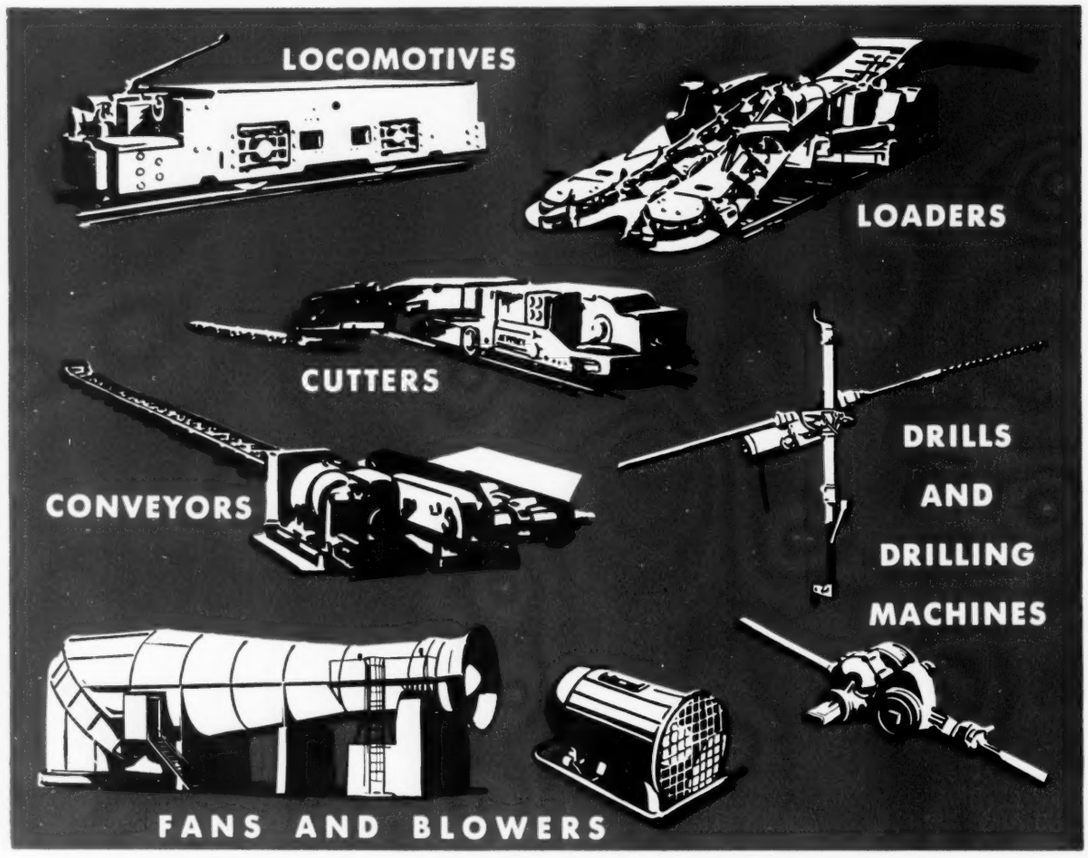
Jeffrey Ventilation Engineers are available to help you solve your ventilation problems.

(Patented)

Jeffrey

EQUIPMENT FOR COAL MINES

JEFFREY SERVICE TO THE COAL MINES MEANS SERVICE TO ALL INDUSTRY



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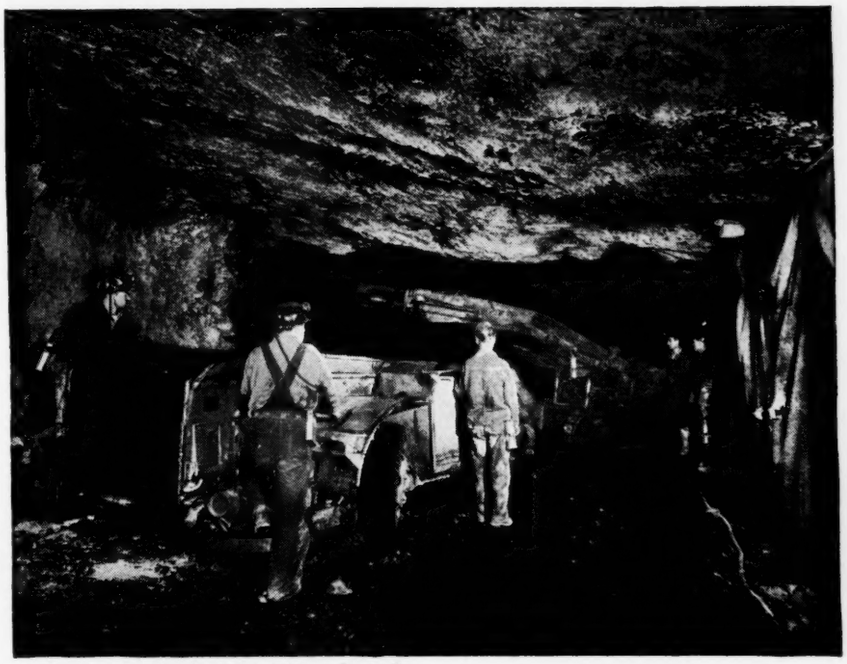
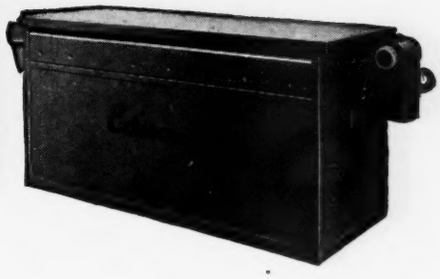
Foreign Plants: Jeffrey Mfg. Co., Ltd., Montreal, Quebec; British Jeffrey-Diamond, Ltd., Wakefield, England; Jeffrey-Galion (Pty), Ltd., Johannesburg, S. A.

BATTERY-POWERED shuttle cars are maintenance savers



Courtesy of ***Engineering and Mining Journal***



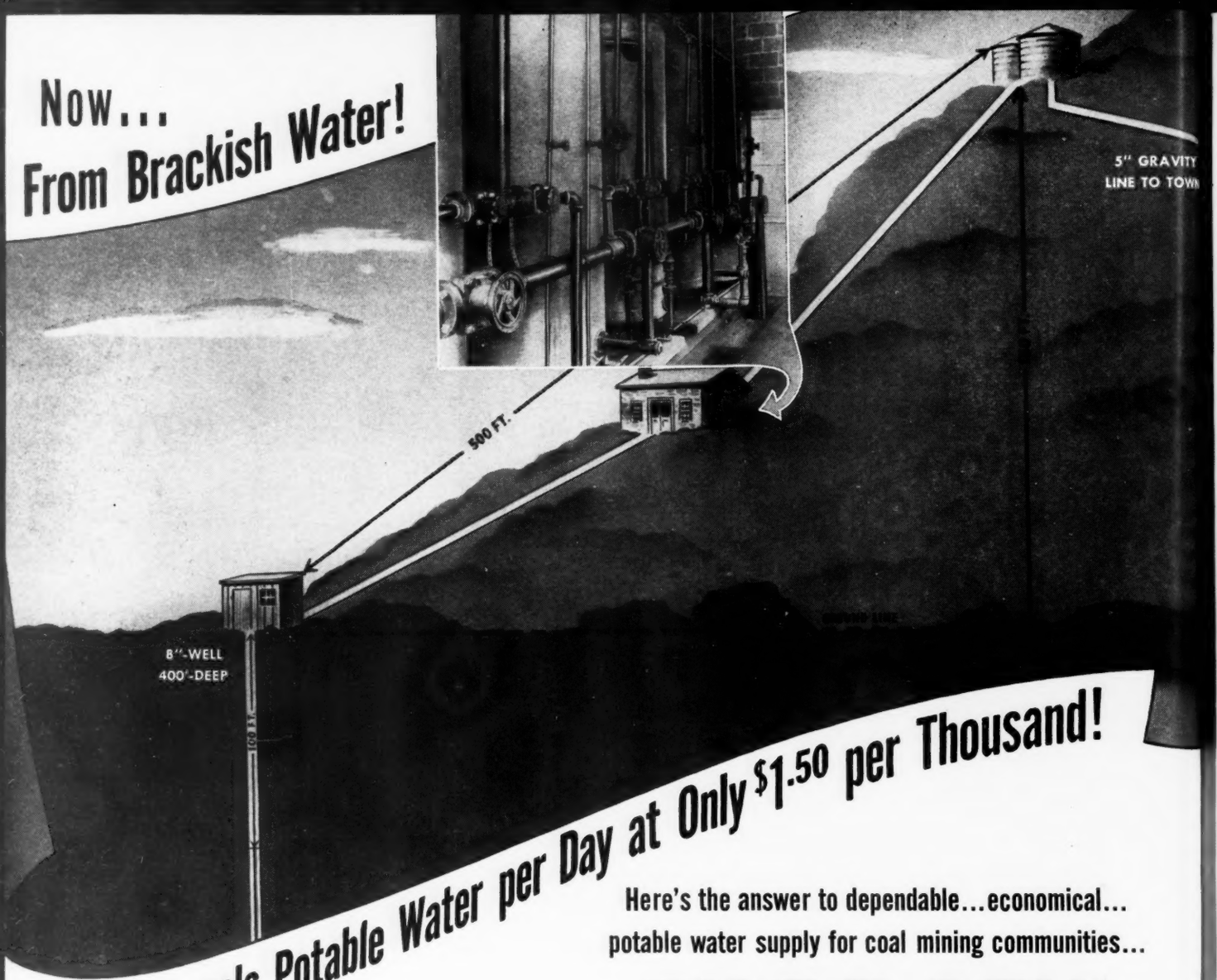
Because they carry their own power supply, battery-operated shuttle cars keep down maintenance requirements chargeable to gathering operations. No accessories are needed for maintaining connections to an external power source. Moving parts requiring repair and replacements are thus reduced to the minimum on battery cars. Their low-voltage operation saves maintenance on commutators, windings and controller parts. Indirectly, too, in numerous ways, battery-powered shuttle cars help to simplify mine maintenance because of their superior operating flexibility, excellent maneuverability and high availability for service.

With batteries exchanged between shifts, a shuttle car is kept continuously supplied with power. While one battery operates the car, the other is charged. As charging can usually be done during off-peak hours, a substantial reduction in maximum power demand on the mine supply is effected. Altogether, the battery-powered shuttle car is an inherently dependable and efficient gathering unit — especially when powered by Edison Alkaline Batteries. With steel-cell construction, an electrolyte that is a preservative of steel, and a fool-proof electrochemical principle of operation, alkaline batteries are the most durable, the longest-lived and most trouble-free of all mine-haulage batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Co., Limited, Montreal and Toronto.

...ALKALINE BATTERIES give most trouble-free power

Edison
ALKALINE BATTERIES

Now... From Brackish Water!



...9,000 gals. Potable Water per Day at Only $1.50 per Thousand!

Here's the answer to dependable...economical... potable water supply for coal mining communities...

FILT-R-STIL*

ION-EXCHANGE WATER DEMINERALIZATION UNIT

This was the problem—David, Kentucky... water brackish and unpotable. Community was forced to truck in approximately 8,000 gallons of water per twenty-four hours. This water was pumped into a large reservoir tank feeding the town of about 100 homes by gravity distribution system.

Here's a workable answer provided by FILT-R-STIL ...Cyanamid engineers studied the problem and made recommendations to meet the specific conditions, which led to the building and installation of a complete FILT-R-STIL ion-exchange water demineralization unit to...

1. **Provide the potable water capacity required for the community.**
2. **Produce potable water at *less cost* than trucking it in.**
3. **Enable community to be independent of outside water sources.**

HOW THE FILT-R-STIL WORKS

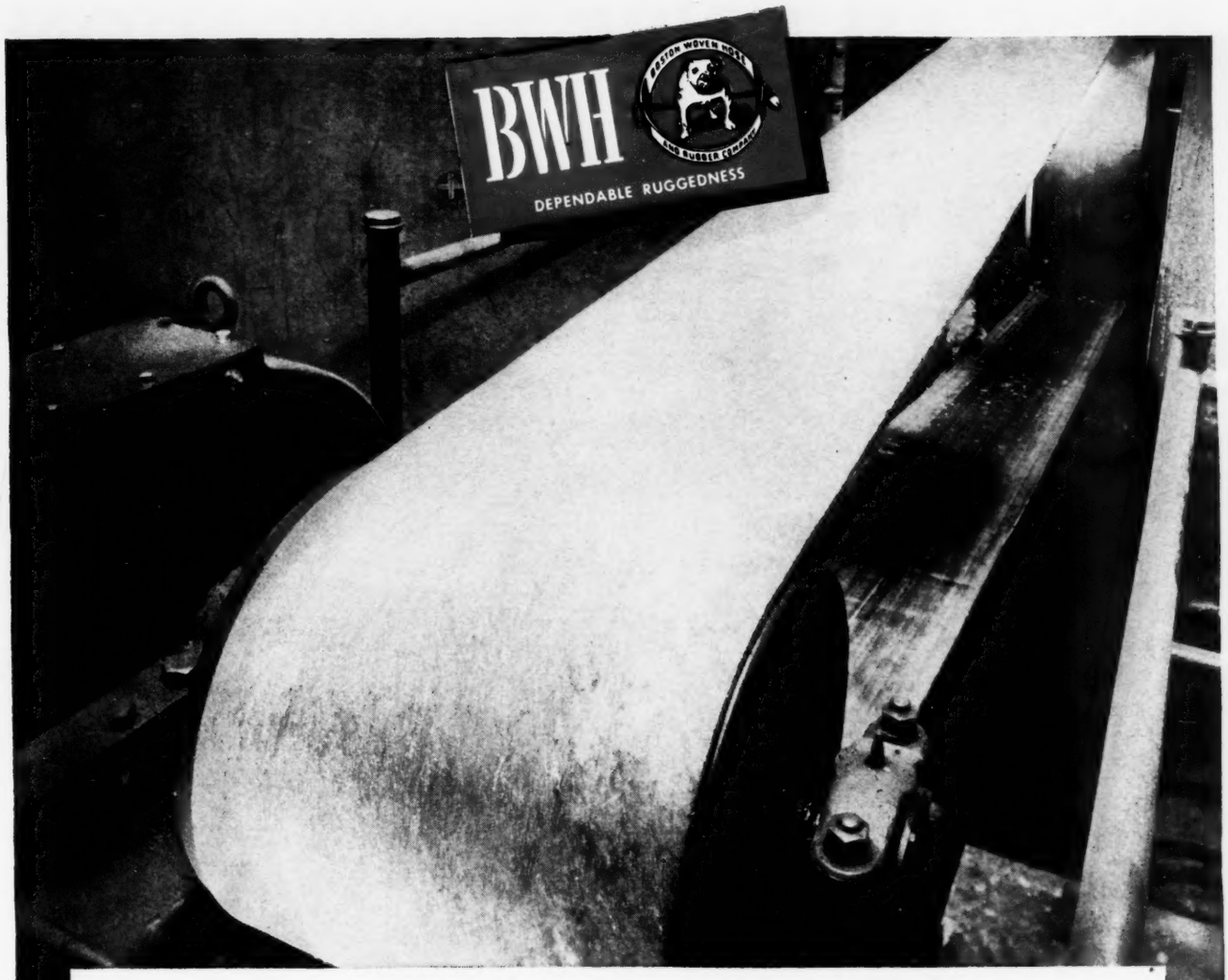
FILT-R-STIL units consist of four treating towers containing beds of IONAC** Resins which remove the dissolved minerals from water. Water is fed under pressure and delivered through a conductivity cell which indicates the quality of water being produced. When resins are exhausted a regenerative system for the reactivation of the IONAC Resins restores the unit to full operating efficiency.

HAVE YOU A POTABLE WATER PROBLEM?

Cyanamid is prepared to work with you "on location" to help you achieve a practical solution. For further details, and descriptive literature on ion-exchange water demineralization principles, units, and applications, consult with...

American Cyanamid & CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
30 Rockefeller Plaza, New York 20, N. Y.

** Trademark
* Reg. U. S. Pat. Off.



15 YEARS OF RUGGED SERVICE . . . THAT'S THE RECORD OF

THIS BWH TRANSMISSION BELT!

Day-in and day-out for fifteen years, this tough BWH Transmission Belt has powered a Beater drive in one of America's great paper mills.

Made by the famous Rotocure process of continuous vulcanization – which eliminates potential trouble spots and increases operating life – this belt proved it could take it . . . under high stress . . . difficult operating conditions . . . and on peak load starting.

The success stories of BULL DOG Transmission Belts are matters of record in ore-crushing, refinery, paper, lumber, and textile industries . . . to name a few. So look to BWH for dependable ruggedness . . . BWH distributors for dependable service!

HAVE YOU A JOB WHERE STAMINA COUNTS?

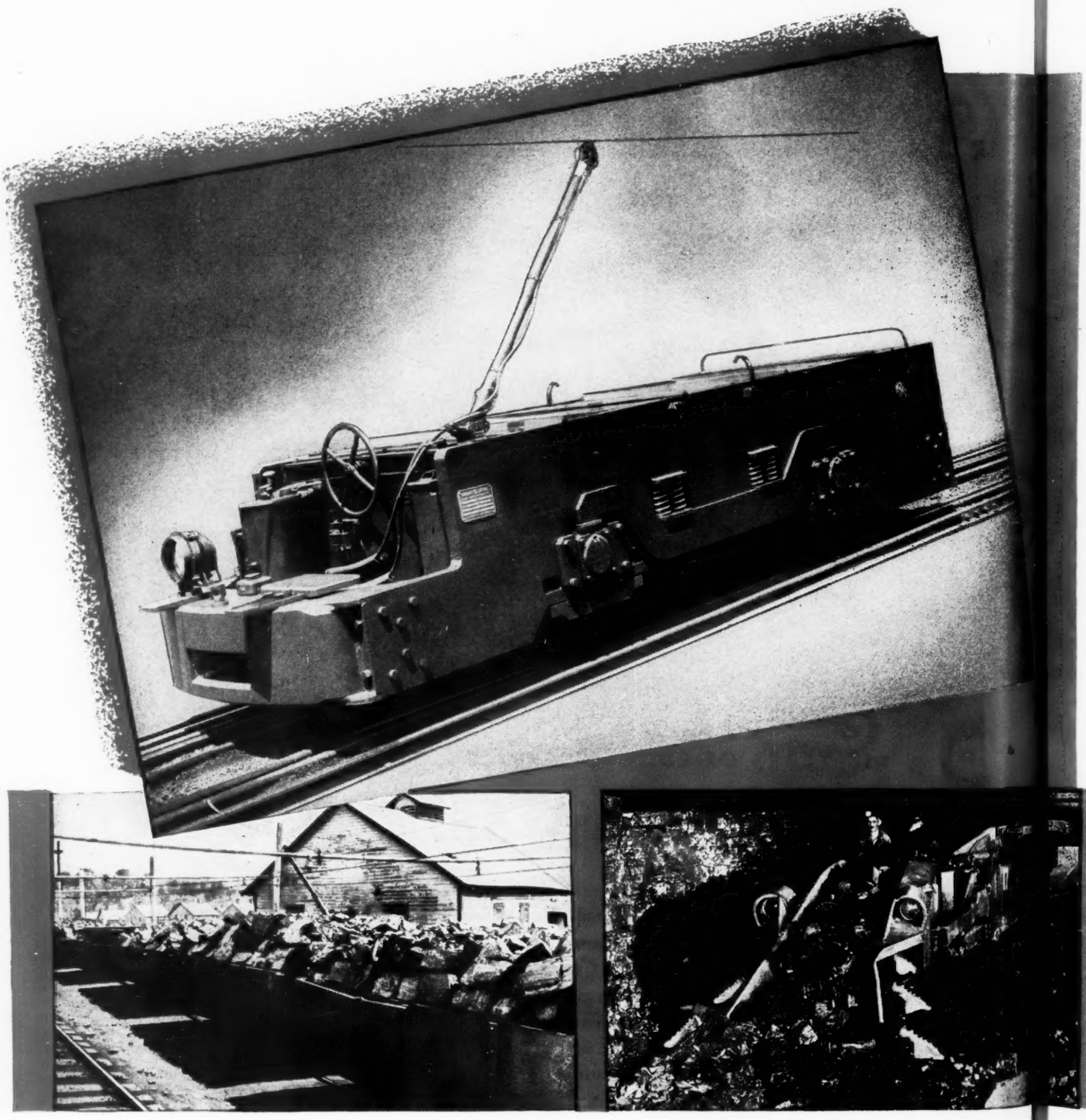
Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor, or write to BWH direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

HOW EFFECTIVE LUBRICATION



TUNE IN THE
TEXACO STAR THEATRE
EVERY SUNDAY NIGHT
STARRING JAMES MELTON
WITH HIS GUEST,
ED WYNN — CBS

TEXACO
REG. T.M.

TEXACO LUBRICANTS

INCREASES MINE

EFFICIENCY

THE *RIGHT* LUBRICANTS, used in the *right* places in the *right* amounts, keep mine machinery running smoothly at peak efficiency. That means machinery lasts longer. Maintenance costs are reduced, mine output is increased. For example —

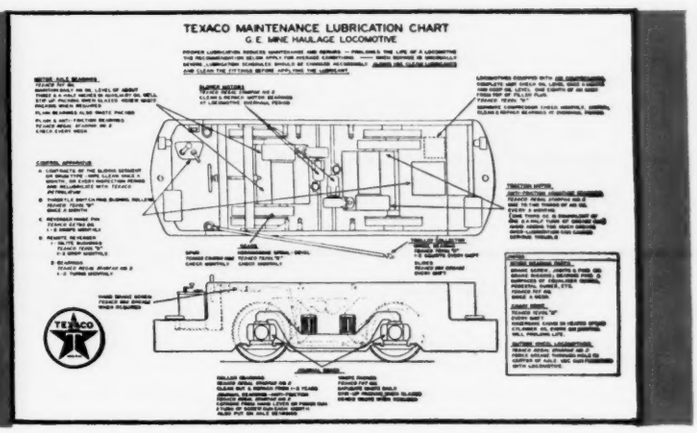
You'll get longer bearing life, and smoother, more trouble-free operation when you use *Texaco Regal Starfak* in grease-lubricated ball and roller bearings of coal mining equipment. That's because . . .

Texaco Regal Starfak has exceptionally high resistance to oxidation and gum formation, to separation and leakage. It stays in the bearing longer, gives greater protection against high bearing temperatures and washout, promotes easier starting.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, *National Sales Division, Dept. C.*, 135 East 42nd Street, New York 17, N. Y.

FREE! Texaco Maintenance Lubrication Charts are prepared in cooperation with leading manufacturers of underground mining machinery. They approve Texaco products for use on cutters, loaders, locomotives, etc. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.



For the Coal Mining Industry

COMPARE SOLIDS PUMPS . . . ONLY A-C GIVES YOU

9 of 10 Big Features!

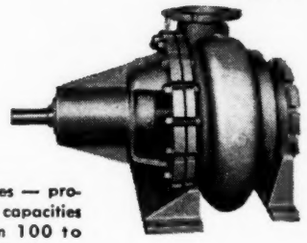
	HERE ARE FEATURES YOU WANT . . .	HERE'S WHY YOU WANT THEM . .	NOW COMPARE PUMPS!				
			A-C SOLIDS PUMP	SOLIDS PUMP A	SOLIDS PUMP B	SOLIDS PUMP C	SOLIDS PUMP D
1	Special abrasion-resistant alloy construction.	Longer pump life. With new A-C pump, users report 2 to 4 times longer pump life!	YES	NO	YES	YES	YES
2	Remove entire rotating element without disturbing the piping.	Simpler maintenance, less downtime. New A-C pump can be knocked-down and reassembled in ½ hour.	YES	NO	YES	NO	NO
3	All working parts quickly and easily accessible.	Cuts downtime. Enables less experienced workers to make repairs. New A-C pump slashes downtime up to 400%!	YES	NO	YES	NO	YES
4	Change capacity quickly without touching pump or parts.	Minimum loss of time. Change capacities on new A-C pump by simply changing Texrope V-Belt drive or drive and motor.	YES	NO	YES	YES	YES
5	Fewest total working parts to wear out.	Reduces repair costs, parts stock. Users of new A-C pump report parts inventory savings up to 70%!	YES	NO	NO	NO	NO
6	Parts must be interchangeable within different size pumps.	Reduces parts inventory. In A-C pump, 1 bearing, bracket and shaft assembly fits 3 pump sizes.	YES	NO	YES	YES	YES
7	Complete flexibility of piping discharge.	Discharge in any direction without complicated piping arrangements. A-C pump allows 5 discharge angles, 45° apart.	YES	NO	NO	YES	NO
8	Widest capacity range within fewest pump sizes.	Fewer pump sizes needed, lower costs. In A-C pump, 3 bearing bracket sizes fit casings ranging from 100 gpm to 7000 gpm.	YES	NO	NO	NO	NO
9	Lowest possible initial cost.	Save money. New A-C pump is priced competitively low—will pay for itself in operational savings.	NO	YES	NO	NO	NO
10	A pump designed to solve coal industry problems — not a substitute "general" type pump.	No wasted efficiency. A-C pump is result of many months of close engineering cooperation between A-C and coal operators.	YES	NO	NO	NO	NO
	Only A-C Pump Rates 2 to 1 Superiority!		➡ 9	1	5	4	4

A 2018

GET 2 TO 4 TIMES LONGER PUMP LIFE!

NEW A-C "Solids-Handling Pump", constructed of special abrasion-resistant alloy, outlasts ordinary pumps up to 400%! Designed after close cooperation with coal engineers, this A-C pump has fewer total working parts to insure parts inventory savings as much as 70%.

Increased efficiency alone will result in operational savings great enough to pay its own way. Perhaps this new A-C pump can lick your pumping problems. Contact your nearby A-C office or write for Bulletin B6381, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

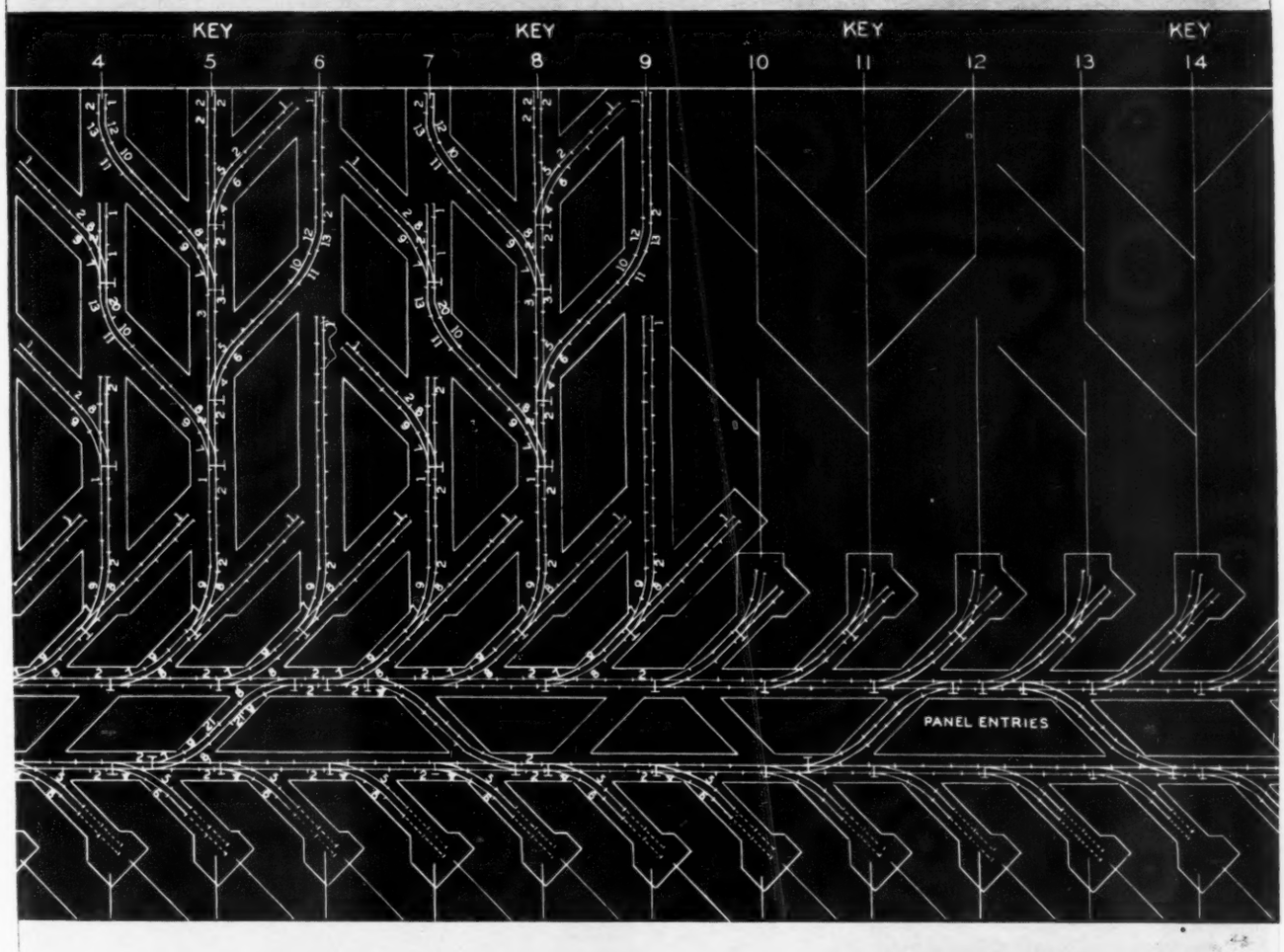


8 sizes — produce capacities from 100 to 7000 gpm.

HEAR THE BOSTON "POPS": *Every Saturday Evening, American Broadcasting Co.*

ALLIS-CHALMERS — **SOLIDS-HANDLING PUMPS**

TRACK PLANNED *and* BUILT



for your individual layout

Here's how we do it—for example, in a panel like the one shown above, which requires only 25 different rails.

In planning track for a layout like this, Bethlehem engineers analyze the room and crosscut centers; height of the coal bed; condition of roof and bottom; size and wheelbase of cutters, loaders, motors, and cars; number of turnouts; radii of curves; angle of driving crosscuts, and all other factors that require consideration.

Then, after the plan has been approved, Bethlehem accurately cuts the rails to proper length and does the precurving to correct radii—all in its own shops. The track reaches the customer in a knocked-down condition, with all special sections marked and ready for assembly. It includes all parts for turnouts and track layout complete. If you wish, a Bethlehem engineer will familiarize your men with the equipment, and supervise the first key installation.

When you purchase Bethlehem Prefabricated Track, you have a system that fits *your* needs . . . one that is easy to install, cheap to maintain. Ask for full details.

★ BETHLEHEM STEEL ★

BETHLEHEM PREFABRICATED TRACK

"Who says there is COAL in this shirt?"

WELL, why not? There is a lot in a shirt besides what you see. There is work. And there is power, too. And processing.

Garment factories and textile mills use *more than six million tons* of COAL a year to run their machines, heat their plants, provide process steam and hot water for dyeing and finishing.

And that isn't all. COAL today is the base material of wonderful new synthetic fibers—marvelously beautiful, durable fabrics.

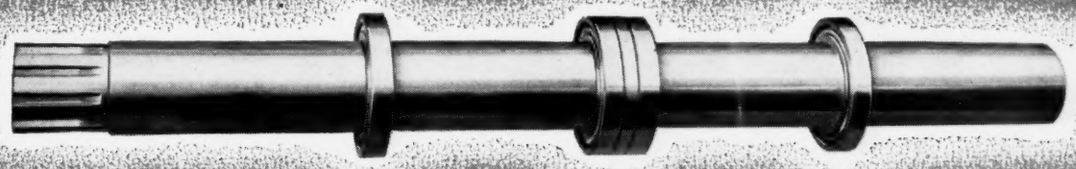
COAL helps shelter you, clothe you, feed you, amuse you—aids a thousand manufactures for your pleasure, work, comfort, safety.

Truly, coal is extraordinarily versatile. Based on this versatility the future of coal is indeed secure.

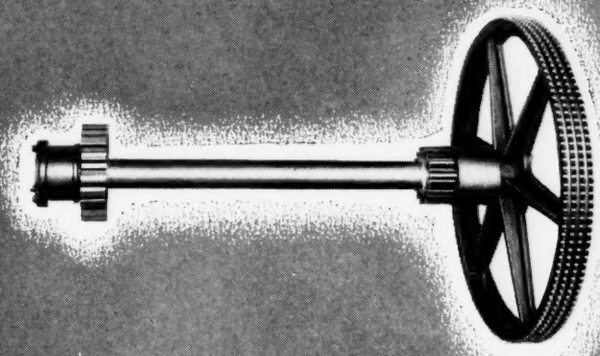
Chesapeake and Ohio has great faith in the destiny of COAL—is one of the largest users of coal—participates in all major coal research programs—extensively advertises the uses and importance of coal. When you ship via Chesapeake and Ohio you can be sure your coal is being hauled by coal-burning locomotives exclusively.

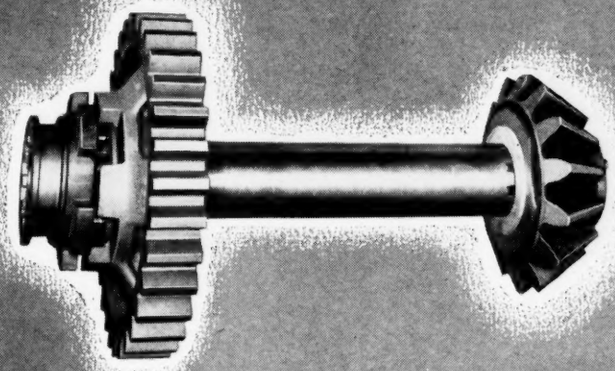
THE CHESAPEAKE AND OHIO RAILWAY

"The 100% Coal Railroad"



YOU CAN SEE THE STRENGTH OF THIS STRAIGHT, SPLINED SHAFTING





● Shafting on the Koehring 605 is straight and strong. No shoulders, no steps, no tapers. Gears are mounted to the shafts by means of precision cut splines, not keyways and keys, because splines do not concentrate twisting strains in one spot but disperse them all around the shaft. Strong, straight, splined shafting is another reason why the Koehring 605 handles the toughest jobs, stays on the job when the going gets tough. New 605 Catalog tells the whole story. Get your copy today.

KOEHRING COMPANY
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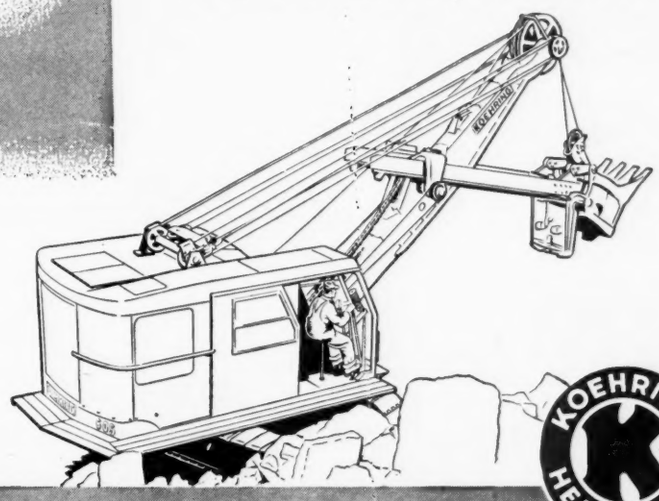
KOEHRING
605

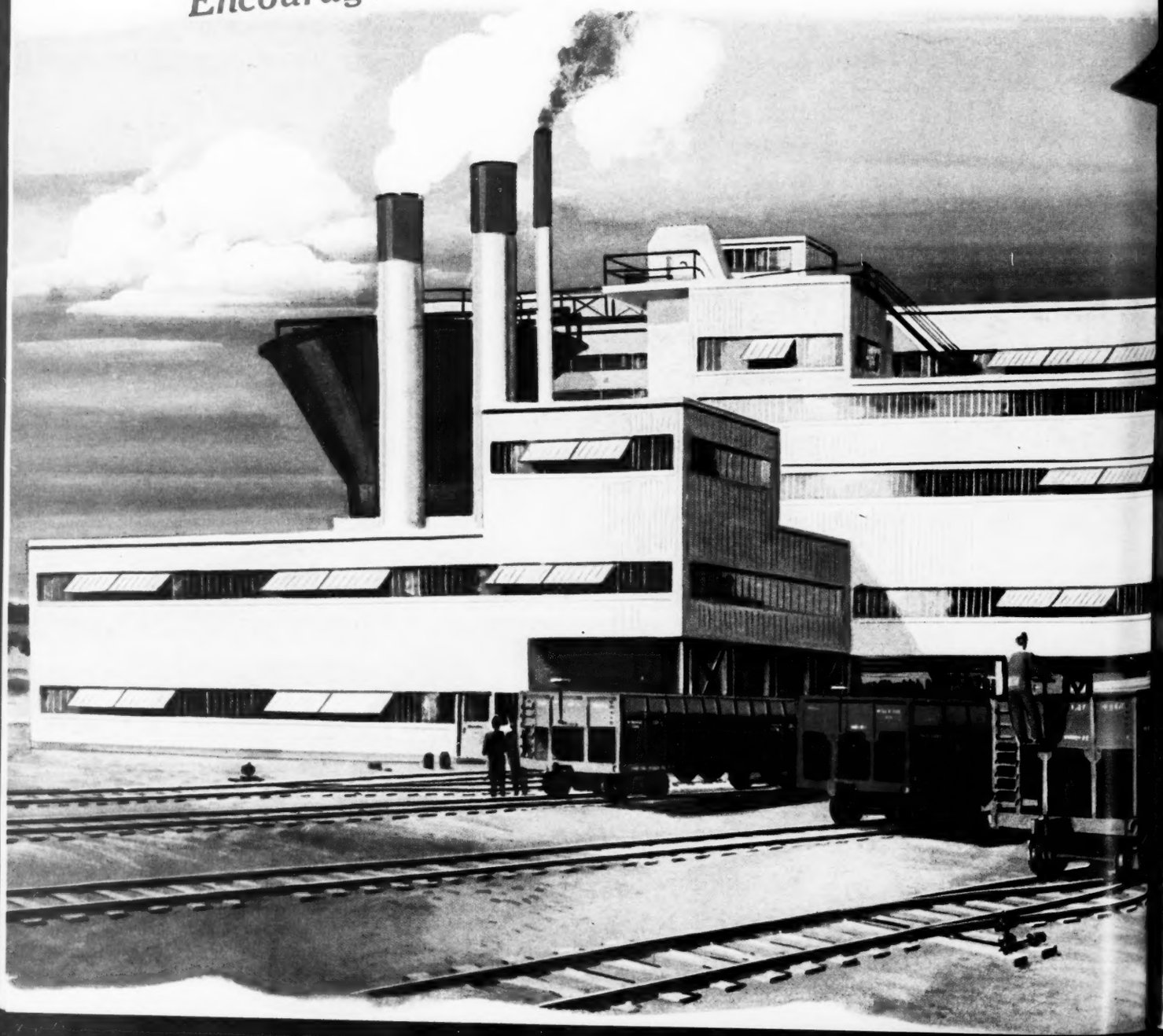


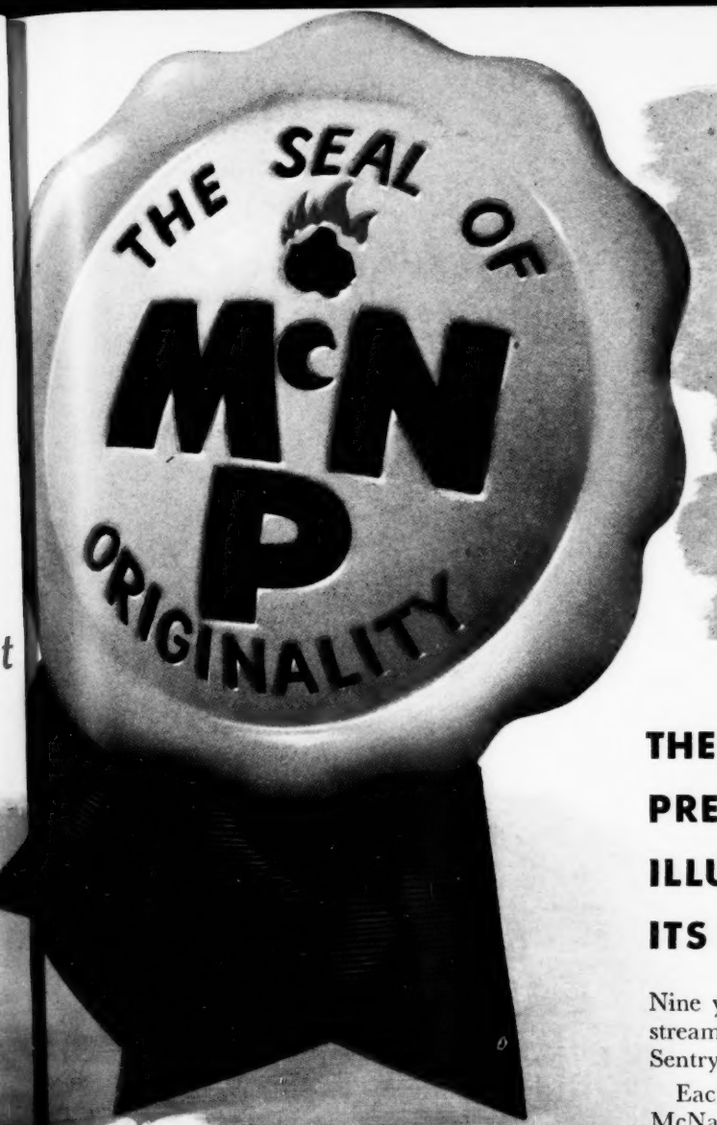
KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

McNALLY PITTSBURG FLAT TOP, SET-BACK ARCHITECTURE IS MORE THAN A ROOF OVER YOUR PLANT, MORE THAN EYE APPEAL ALONE . . . .

Brings Daylight Closer to Important Equipment
. . . Daylight is always worth more than it costs
Improves Ventilation; Requires Less Heat Load
Encourages Cleanliness at Lower Maintenance Cost





As you travel through coal fields, the flat top, set-back roofs, and broad expanses of continuous sash of modern coal preparation plants have become the "seal of originality" for McNally Pittsburg architectural design. McNally Pittsburg pioneered in this streamlined type of architecture. It has more than eye appeal . . . it has a functional purpose . . . to facilitate production by compact, easily maintained cubical interiors, to furnish daylight to men working around important equipment, to provide well-ventilated working space, to establish the coal preparation plant as a model of industrial efficiency.

THE FIRST MODERNISTIC COAL PREPARATION PLANT IN AMERICA, ILLUSTRATED HERE, WILL CELEBRATE ITS 9th ANNIVERSARY THIS YEAR

Nine years ago, in Madisonville, Kentucky, the first modernistic, streamlined coal preparation plant in America was erected for Sentry Coal Mining Company.

Each unit in the great plant was designed and engineered by McNally Pittsburg, built in their shops, delivered to the site, and erected by the Company's erecting crews.

Sentry a Winner in 1944 and Again in 1945 in the Coal for Victory Awards

The original rated capacity of Sentry plant was 500 tph. Equipment included two automatic McNally-Norton washers, stoker coal crushers, heavy-duty breakers, scraper flight conveyors, and automatic car loading apparatus and control. To make the plant a 100 per cent preparation unit, McNally-Vissac thermal drying equipment was added later, the dryer unit appearing in the foreground of the illustration.

During the first month of operation, Sentry's prepared coal was shipped to 13 states . . . a market which Sentry has continued to hold during the years and to which it has added tremendous volume.

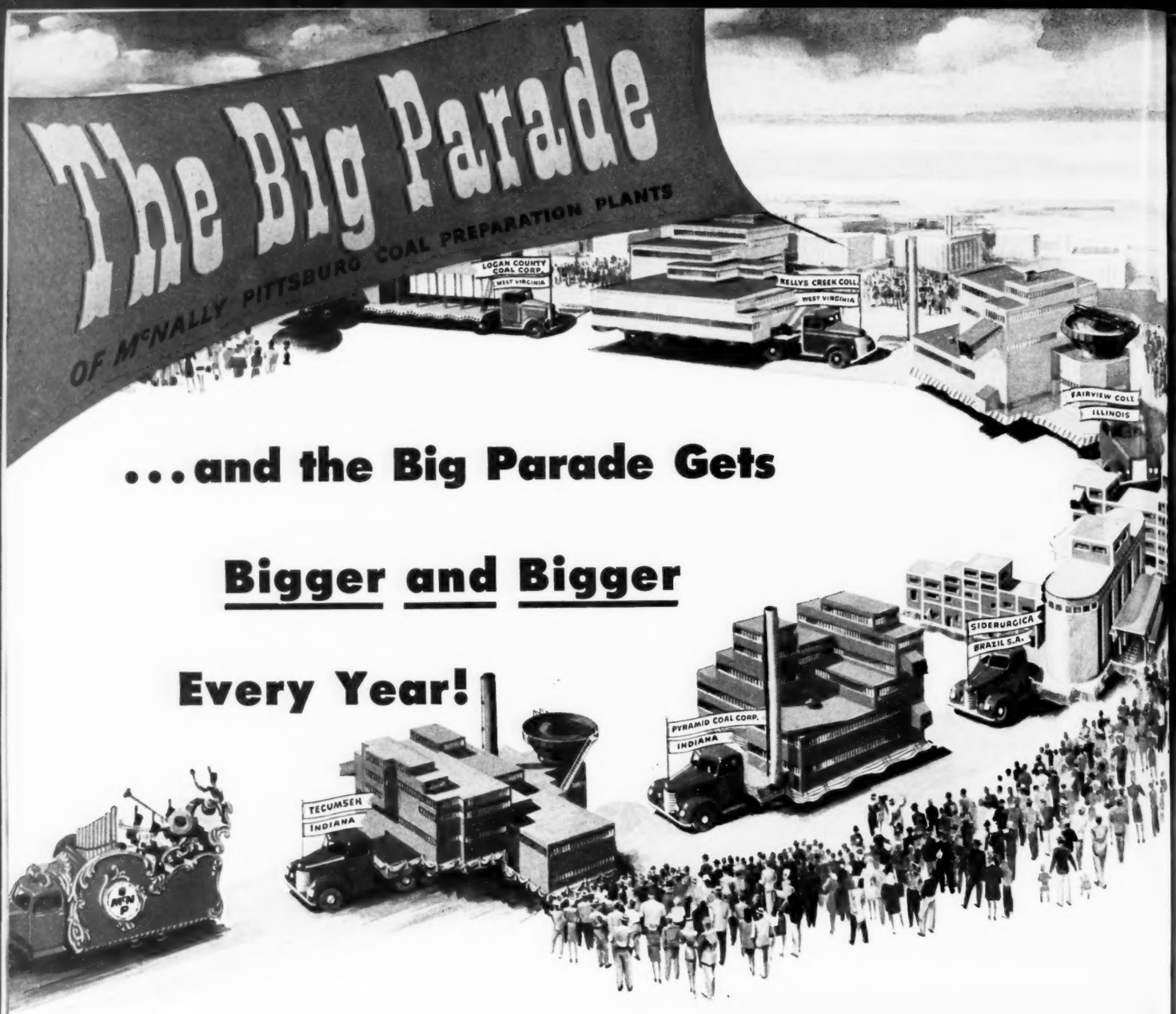
The technical staff responsible for designing and engineering numerous successful coal preparation plants is available for consultation and discussion of coal preparation problems wherever bituminous coal is mined, anywhere in the world.

PLAN NOW TO DELIVER SPECIFICATION FUEL

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill. • Pittsburgh 22, Pa. • Cairo Postal 1210 Buenos Aires



...and the Big Parade Gets

Bigger and Bigger

Every Year!

Five new coal preparation plants are in the course of construction right now. They are *mighty* plants . . . one, the largest ever undertaken anywhere in the world! These plants will have an annual tonnage of over 8,000,000 tons of premium fuel. This addition to the enormous tonnage already being prepared in McNally Pittsburg coal preparation plants brings the yearly total of cleaned coal well over the 50 million mark.

From basic engineering to complete plant . . . all from one source with undivided responsibility. Of extreme importance to the smooth operation of these coal preparation plants is the closely knit McNally Pittsburg organization which assumes responsibility for every unit . . . from the streamlined building which houses the equipment to the smallest piece of equipment in it. That's really centralized engineering and undivided responsibility.

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kans. • Chicago 1, Ill.
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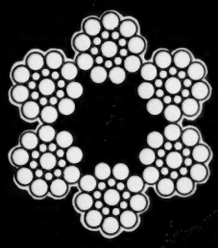
Best where wear is Hardest!



UPSON-WALTON
6 x 19 SEALE WIRE ROPE

FOR traction ropes on aerial tramways...for button conveyors and track cables . . . for car haulage systems, car pullers and spotters . . . for mine scrapers and slushers and slope haulages—many industries require a rope that is moderately flexible and still resists wear and abrasion to a very marked degree.

Upson-Walton Seale Layrite Perfection cable will outwear any other type of rope regularly used in this service. This is true because the rope is designed with coarser outer wires which can withstand abrasion longer.

Upson-Walton Seale is your best bet where the rope comes in contact with abrasive materials or is subjected to continual dragging on the ground, or where extreme friction and slippage are encountered.

Hemp center or, where conditions are most severe, IWRC (independent wire rope center).

Perfection grade—because this improved plow steel is the strongest and toughest and most resistant to wear of all the grades of wire used to make rope.

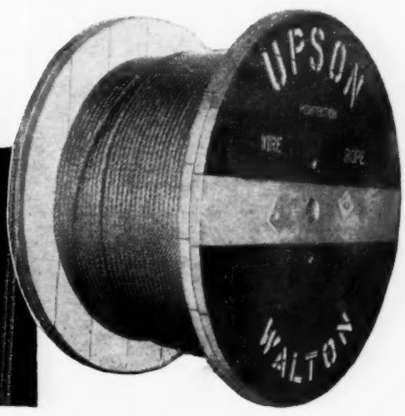
Layrite—because this fine *pre*formed wire rope results in longer life, greater safety and greater economy.

U-W

Established 1871

Upson-Walton 6 x 19 Seale Perfection Layrite is best where wear is hardest!

Copyright 1946—The Upson-Walton Company

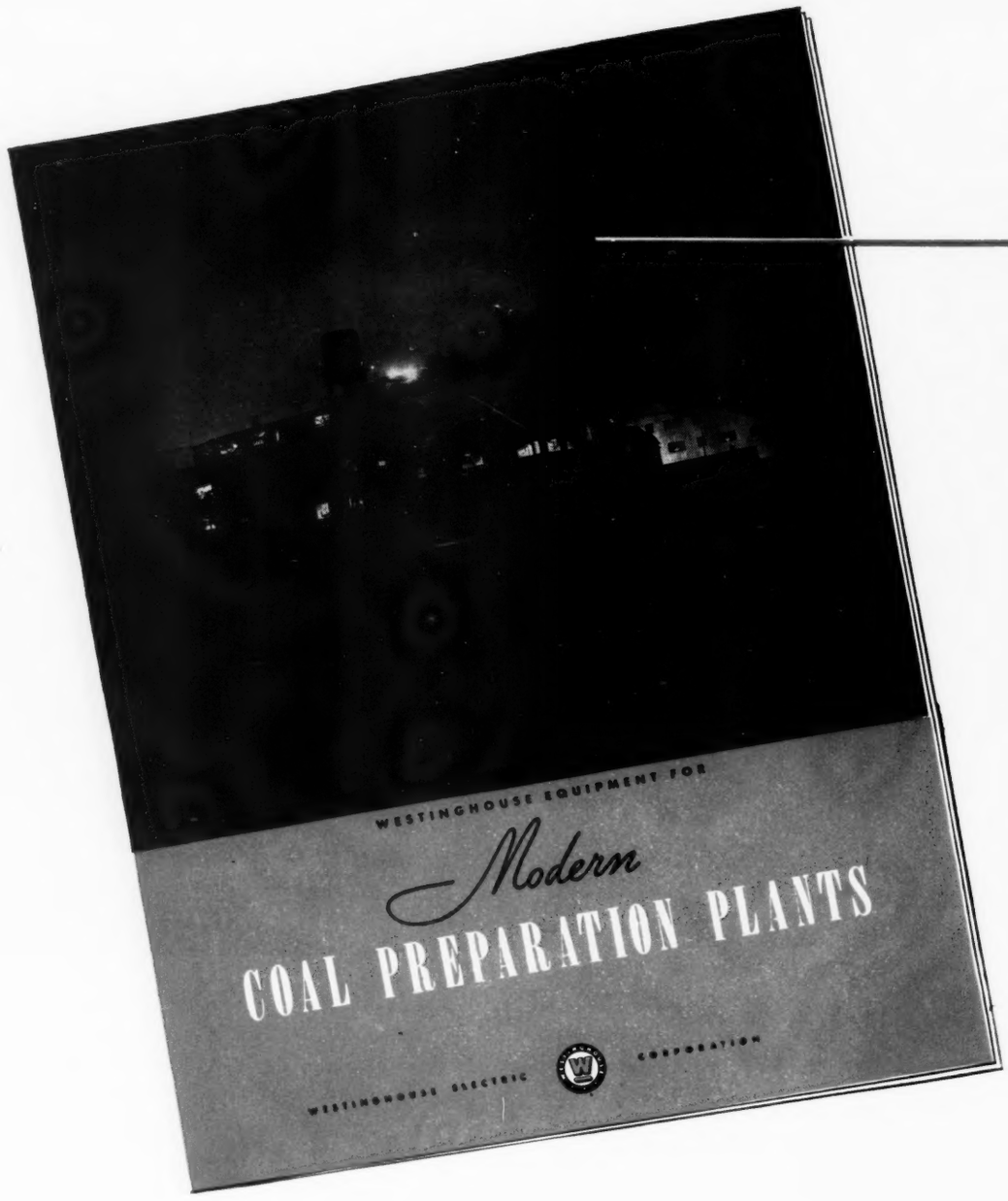


THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

MAIN OFFICES AND FACTORY: CLEVELAND 13, OHIO

114 Broad Street, New York 4 | 737 W. Van Buren Street, Chicago 7 | 241 Oliver Building, Pittsburgh 22



SEND FOR THIS BOOK TODAY!

Just off the press—a guide to the complete electrification of your new coal preparation plant. Ask your Westinghouse office to send you a copy of B-3453.

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

Ready now!

a guide to cleaner coal at lower cost

through *complete electrification* by Westinghouse

The electrical apparatus in your coal preparation plant is important . . . so important that upon it depends the efficient, economical operation of the entire plant.

Thorough and long coal plant electrification experience, ***plus*** a complete line of co-ordinated electrical equipment—these are two requirements for efficient operation of today's coal preparation plants that Westinghouse meets completely.

By giving Westinghouse complete and undivided responsibility for all electrical equipment you save time and money in every step—in engineering, installation and maintenance. You are assured of factory-built and tested apparatus designed to do your job at maximum efficiency under all operating conditions.

Westinghouse maintains a complete field service, too—backed by 34 District Manufacturing and Repair Shops which give you quick service on any operating or maintenance problem. For complete information, call your Westinghouse office, or write for B-3453—Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

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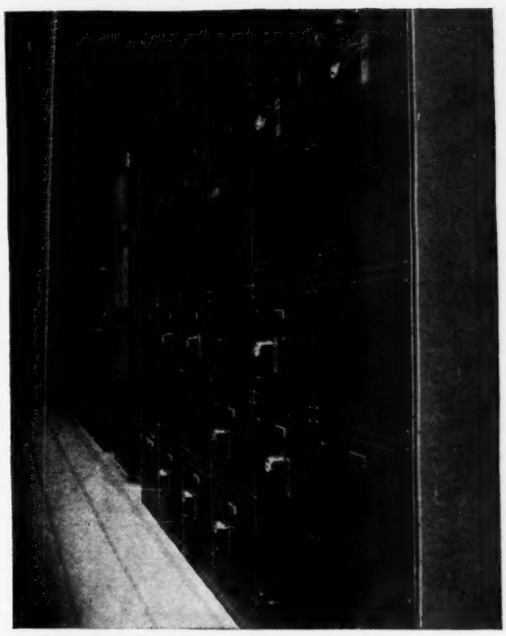
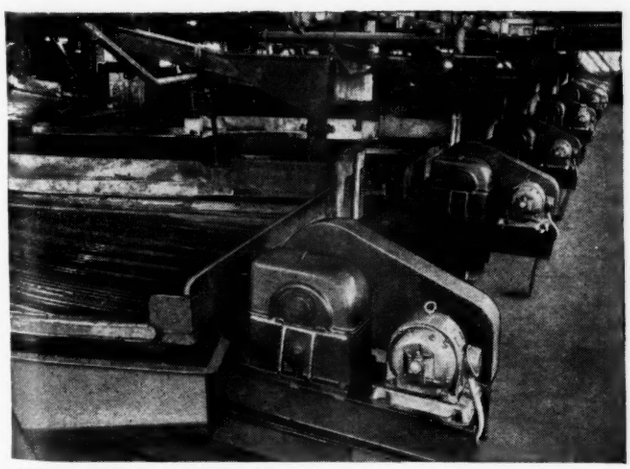
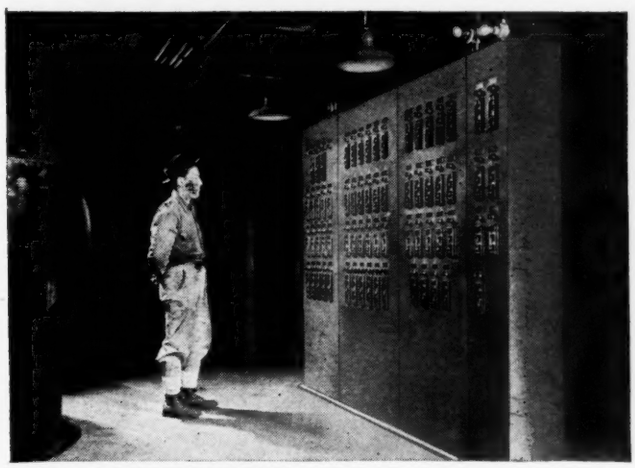


WESTINGHOUSE POWER CENTER with Type ASL *air-cooled* transformer for low maintenance. Low-voltage distribution section in foreground.



WESTINGHOUSE MOTORS drive jigs and concentrating tables for washing metallurgical coal.



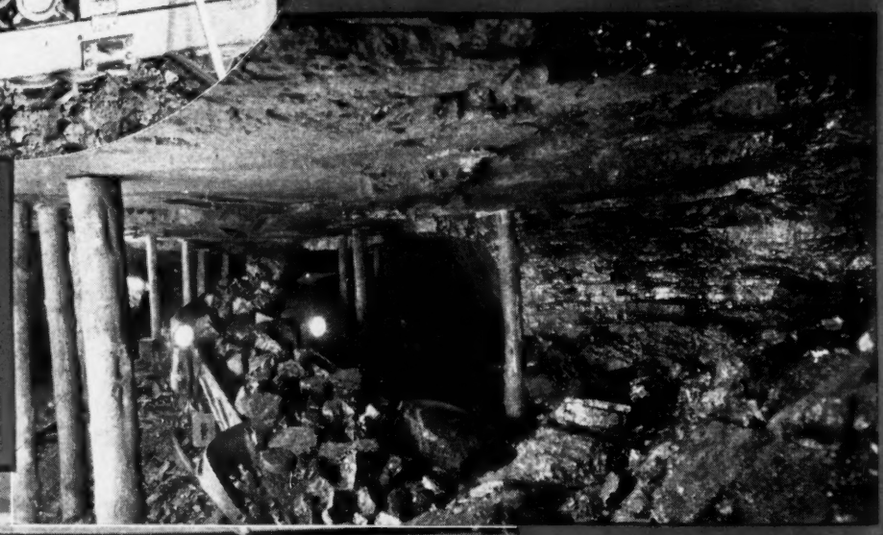
THIS PUSHBUTTON CONTROL STATION centralizes in one place all the control for 63 motors involved in the operation of a 750 ton-per-hour coal cleaning plant.

Operating Partner of the Mining Industry

Efficiency FOR

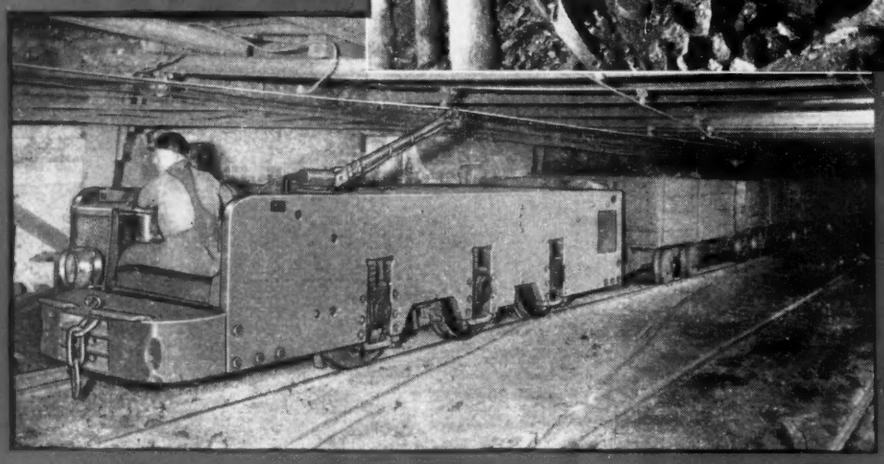
11736

Mounted machines that will cut at any practical height in the seam.



10731

High capacity, mobile loaders that will handle coal, slate or rock.



12370

Electric trolley and storage battery locomotives for gathering and haulage.

GOODMAN MANUFACTURING COMPANY

Wilkes-Barre · Pittsburgh · Huntington · Terre Haute

MECHANIZATION'S *toughest* JOBS

• • • calls for machines that fit a mining system best suited to specific underground conditions — machines that will produce peak tonnage with speed, economy and safety.

Consult Goodman for a thorough consideration of your cutting, loading and transporting problems.

Undercutting and top cutting shortwalls; hydraulic controls for promoting ease of operation, Bugdusters for automatic disposal of slack.

18144

The Duckbill-Shaker Conveyor for combined loading and transporting with a continuous flow of coal from face to mine car.

13221

Belts for transporting up to 500 tons per hour for distances up to 5,000 feet.

12070

HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS

Birmingham • Denver • Salt Lake City

2 IMPROVED CABLE DESIGNS

FUNGUS-RESISTANT
SPIRALWEAVE

Power Cable for Inside Power Distribution

A new Fungus Inhibitor now included in the saturating compound of Spiralweave cable prevents the growth of destructive mold in damp mine locations, thereby prolonging cable life.

The heavy, tightly woven Spiralweave "firehose" covering has always been capable of withstanding mechanical abuse. Efficient service in many mines for more than 20 years proves the practical worth of this cable. In fact, one anthracite mine installed several carloads of Spiralweave cable 25 years ago and it is still in excellent condition.

Even longer service can be expected of the new Spiralweave cable with the addition of the Fungus Inhibitor. Use it on your next installation.

HAZARD insulated wires

for Increasing Mining Efficiency

FLAME-RESISTANT

HAZACORD

Flexible Trailing Cable

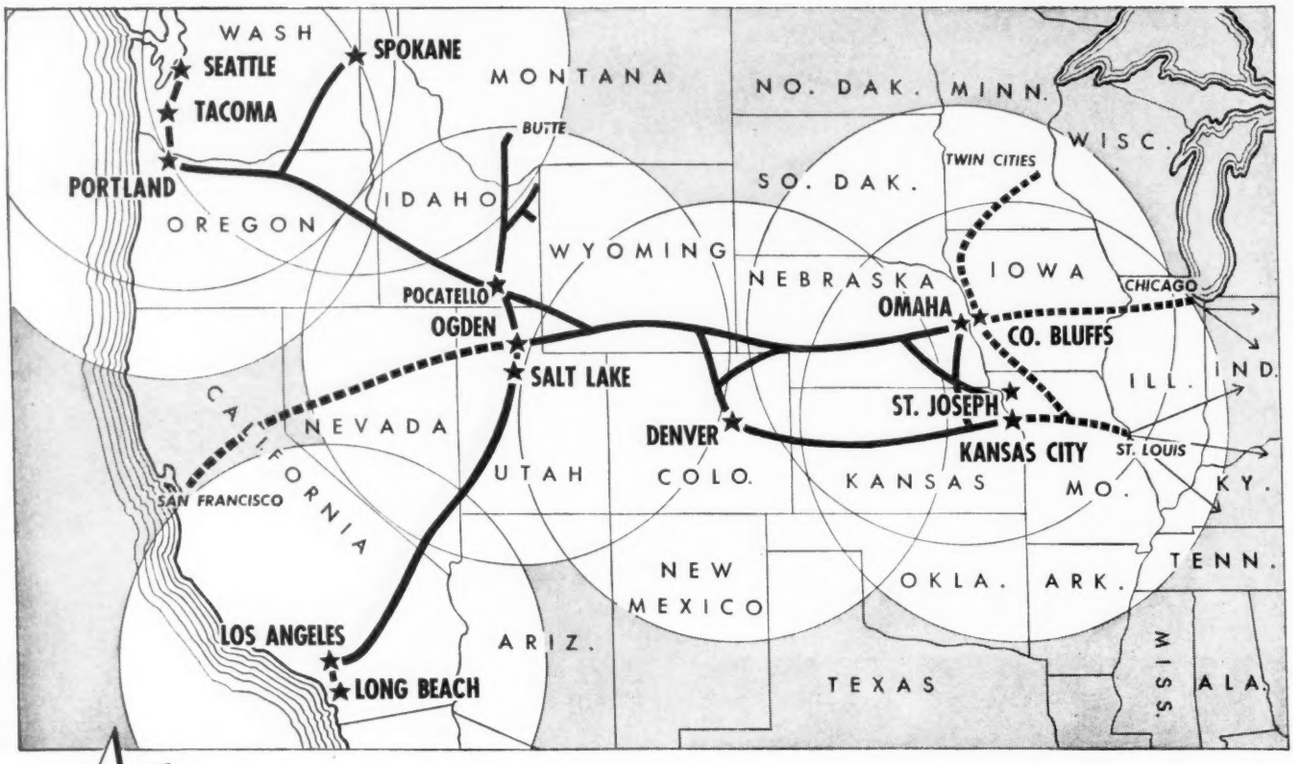
Neoprene synthetic rubber is now standard for Hazacord reel cable jackets. This material will not support combustion – a most important attribute, as it prevents the communication of fire from one location in the mine to another Meets the exacting flame-resistance tests now required by the Pennsylvania Bureau of Mines.

This Hazaprene Jacket (made with Neoprene) will not rot or deteriorate when in contact with oil, acids, alkalis or moisture constantly encountered on mine floors.

Toughness and flexibility of the Neoprene jacket protect the conductor against abrasion caused by constant rubbing across rough mine surfaces. Order Hazacord from Hazard Insulated Wire Works, Division of The Okonite Co., Wilkes-Barre, Pa.

and cables for every mining use

4531



Opportunity for Industry

The western territory served by Union Pacific is rich in countless raw materials required by industry; has power and other necessary facilities; has a high type of native-born labor. Here lies the opportunity for industry to build and expand.

Among the principal industrial tracts owned or served by Union Pacific are those located in, or near by, the following cities:

Omaha, Neb.	Ogden, Utah
Council Bluffs, Iowa	Portland, Oregon
St. Joseph, Mo.	Seattle, Wash.
Kansas City, Mo.-Kans.	Tacoma, Wash.
(Fairfax District)	Spokane, Wash.
Denver, Colo.	Los Angeles, Cal.
Salt Lake City, Utah	Long Beach, Cal.

As the map shows, all these cities are located on the main lines of the Union Pacific Railroad.

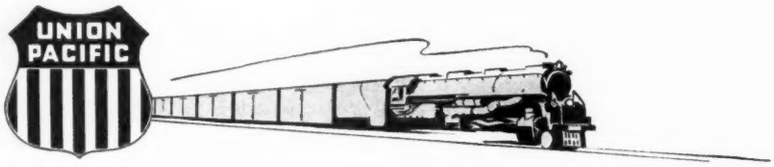
The circles on the map indicate 500-mile distribution areas. In normal times, Union Pacific operates a fast, merchandise freight (L. C. L.) service within these short-haul areas, with door-to-door pick up and delivery service.

These industrial properties are improved and occupied by many diversified manufacturing and commercial enterprises.

Necessary utilities are available and each tract is served by adequate industrial trackage. Whenever required, additional trackage can be provided.

You are cordially invited to write W. H. HULSIZER, General Manager of Properties, Union Pacific Railroad, Omaha 2, Nebraska, regarding industrial districts in territory served by Union Pacific.

be Specific – say "Union Pacific"



The Progressive

UNION PACIFIC RAILROAD

The Strategic Middle Route

Our Hats Off...

to 142 coal mines

A TOUGH JOB—a job deserving of public appreciation—is being done and done well by America's coal industry. Against heavy odds, it's advancing steadily toward increased tonnages, improved efficiency.

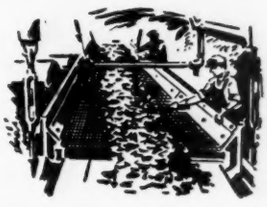
Pacemakers in this progress are the 142 mines, large and small, that have won Coal-for-Victory awards. Our hat's off to them . . . and to the men who run and man the mines to produce such results.

Roebling is proud to be associated in its own small way with this team. And in the busy, competitive years ahead, we'll continue doing our bit in promoting mining efficiency . . . with wire rope, electrical wires and cables, and wire screen designed and tested for superior service, maximum safety.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING WIRE ROPE of the right type and construction provides the maximum service on heavy power shovels, shaft hoists, draglines, aerial conveyors and other types of material handling equipment.

ROEBLING ELECTRICAL WIRES AND CABLES supply power to mechanized equipment and to lighting, ventilating and pumping systems. They're built especially to resist abrasion, moisture and corrosion.



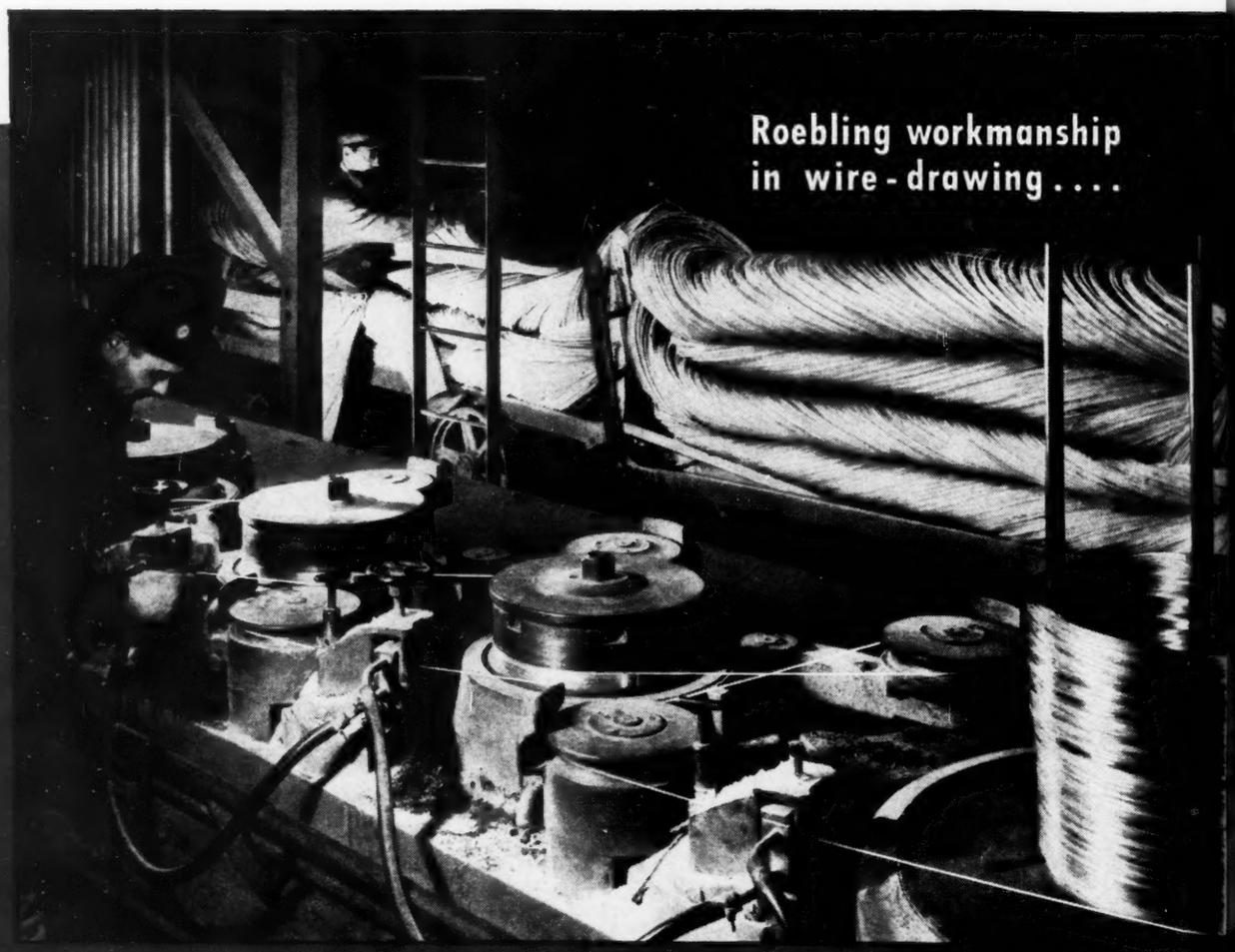
ROEBLING WIRE SCREENS on shakers or vibrators for grading and cleaning coal are made of finest steels to fit individual requirements. Mesh sizes and overall dimensions remain uniform throughout long service.

ROEBLING

PACEMAKER IN WIRE PRODUCTS

The right Wire Rope

CAN CUT MINING COSTS



ROEBLING

PACEMAKER IN WIRE PRODUCTS

TODAY, mining operations are returning to "normal" peacetime conditions. But it's far from the pre-war normal. Equipment costs are up. Labor costs are higher. Operating costs *must be held down*. One way to help hold them down is to specify Roebling "Blue Center" Steel Wire Rope.

Here's a tough rope that stands up under shocks, strains or high speeds. Whether you're stripping or deep mining, specify it in the right construction and you'll have long-life wire rope adding efficiency to your equipment.

In preformed or non-preformed wire rope, Roebling engineers can help you save . . . with sound advice on rope selection, installation and operation. Ask our nearest branch office about it.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

OLD MAN COMPETITION IS GETTING READY...

Roebling wire rope can help keep your costs down

means longer rope performance on the job!

WIRE ROPE AND STRAND • FITTINGS • SLINGS • ELECTRICAL WIRES AND CABLES • COLD ROLLED STRIP • WIRE CLOTH AND NETTING • SUSPENSION BRIDGES AND CABLES HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • AERIAL WIRE ROPE SYSTEMS • AIRCORD, SWAGED TERMINALS AND ASSEMBLIES

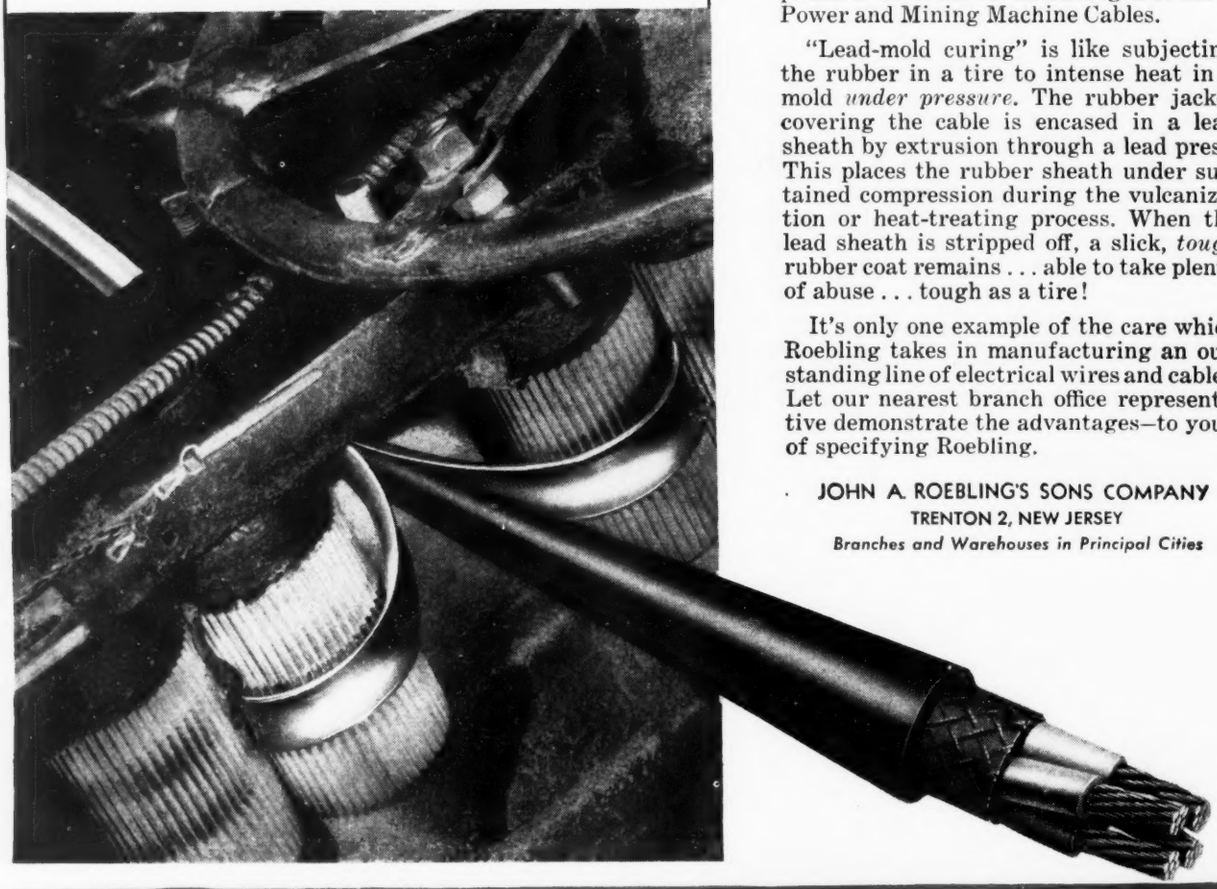
JR ROEBLING

"LEAD-MOLD CURED"

for EXTRA toughness!

IN MINING MACHINE CABLES, IN PORTABLE POWER CABLES

One Reason Why These ROEBLING Cables Pay Off in Longer Service



IT TAKES MORE TIME . . . materials . . . man-hours . . . to "lead-mold cure" rubber cable jackets. But we know it pays off for the cable user . . . in greater resiliency, tensile strength, resistance to tearing, abrasion, impact, and moisture. And because performance tests prove its advantages, this process is used on Roebling Portable Power and Mining Machine Cables.

"Lead-mold curing" is like subjecting the rubber in a tire to intense heat in a mold *under pressure*. The rubber jacket covering the cable is encased in a lead sheath by extrusion through a lead press. This places the rubber sheath under sustained compression during the vulcanization or heat-treating process. When the lead sheath is stripped off, a slick, *tough* rubber coat remains . . . able to take plenty of abuse . . . tough as a tire!

It's only one example of the care which Roebling takes in manufacturing an outstanding line of electrical wires and cables. Let our nearest branch office representative demonstrate the advantages—to you—of specifying Roebling.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING

ELECTRICAL WIRES AND CABLES

Weatherproof Wire • Service Entrance Cables • Rubber-Covered Wires and Cables (Including Small Diameter Building Wires and Cables) Rubber Sheathed Portable Cables • Rubber Insulated Power Cables • Magnet Wire • Telephone Wires • Pigtail and Braided Copper • Trolley Contact Wire • Bare Copper Strand • Varnished Cambric Power Cables.

2 out of 3 winners* use Standard Oil mine lubricants

*Of the 25 mines in the Midwest that won Coal-For-Victory awards announced in Coal Age, 16 are Standard Oil Company (Indiana) customers.

Good lubrication must be part of any efficient mine operation. It is no wonder then that so many of the winners of the Coal-For-Victory awards use Standard Oil mine lubricants. Standard has long offered its coal-mine customers two advantages that lead to better mine operation.

1. A line of specialized mine lubricants

Through research and through tests in mine service, Standard has developed lubricants specifically fitted to meet mine operators' needs. *Superla Mine Lubricants* are available in several grades to meet accurately the requirements of all mine lubrication where thickened oils are used. They reduce coking and deposits to the minimum—reduce overheating, lost machine time, and wear.

2. Lubrication Engineering Service

Standard has specially trained Engineers located in mining areas in the Midwest. They are familiar with all phases of mine lubrication. They're constantly working with mine personnel to help establish practices that reduce wear, decrease consumption, or step up machine output.

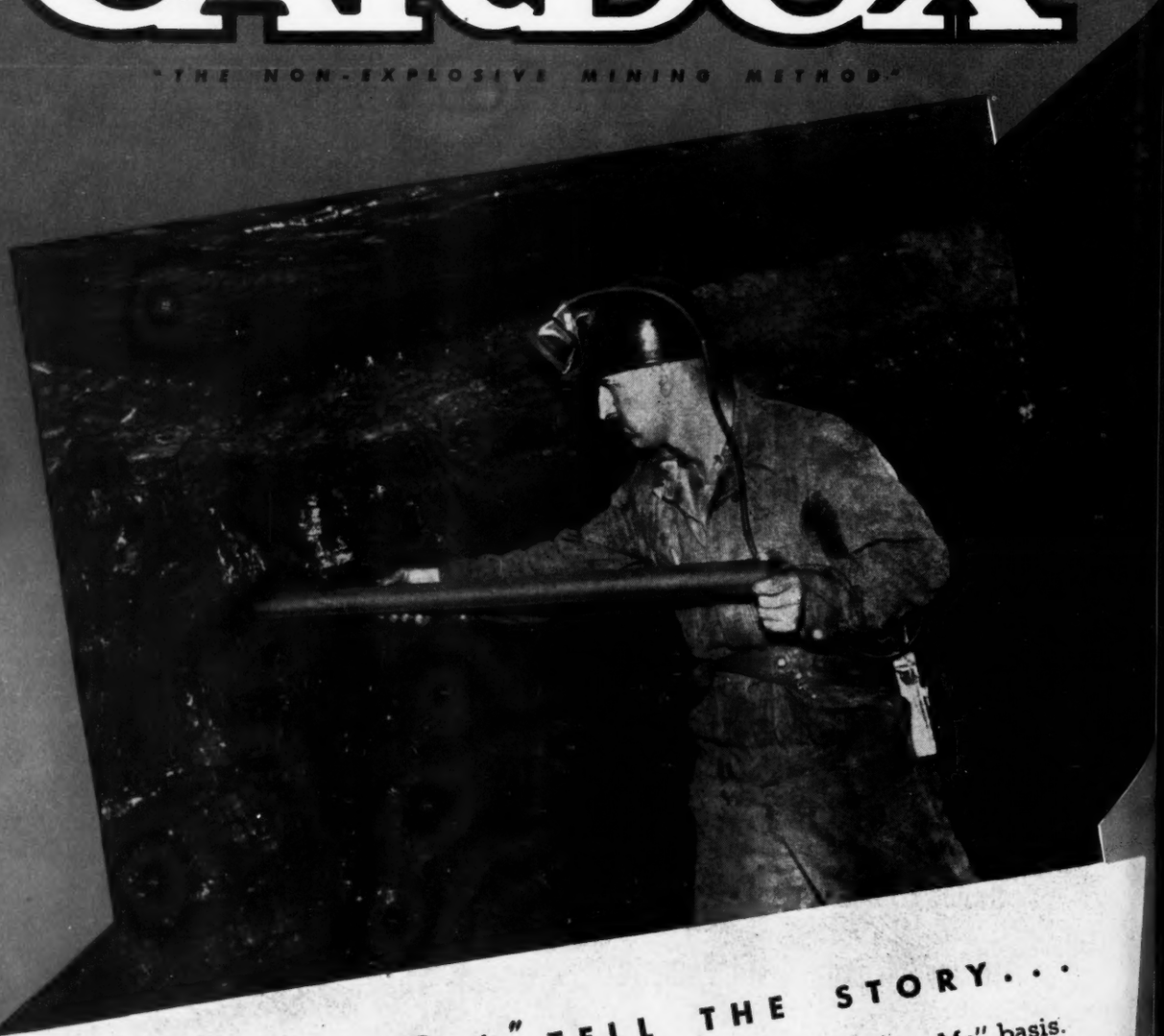
For best results in getting the utmost advantage from all Standard Oil mine lubricants, let a Standard Oil Lubrication Engineer help you apply them. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Lubrication Engineer in your locality specializing in mine problems.

SUPERLA
MINE LUBRICANTS

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"



"Preparation Tests" TELL THE STORY . . .

The CARDOX mining method is sold on a "Show Me" basis. A first step is "preparation tests" to demonstrate the mild effect of CARDOX on coal structure.

Cardox Engineers find that to get a true test, samples for screen analysis must be taken from 18' to 20' beyond the last fall produced by explosives. This is necessary because the structure of the coal in the intervening area is so weakened by shatter-cracks caused by explosion shocks that it is useless for test purposes.

CARDOX CORPORATION

Protects

LIVES AND PROPERTY BY REDUCING ROOF AND RIB FAILURES

Two important facts stand out in the accident record of bituminous mines: (1) Approximately 51% of underground fatalities are caused by falls from roof and sides; (2) The majority of roof, face and side fall accidents are at or near the working face.

Because CARDOX acts with a slow heaving, spreading and shearing action, the effect of its discharge is mild. There is little disturbance to roof and rib structure. It logically follows that roof and rib failures decrease when the CARDOX mining method is adopted. In addition, the CARDOX mining method reduces timbering problems, lowers other production costs, permits the use of longer cutter bars and rolls out the coal for maximum efficiency with mechanical loaders.

Let us demonstrate the many safety and production advantages of CARDOX by a test in your own mine.

BELL BUILDING • CHICAGO 1, ILLINOIS

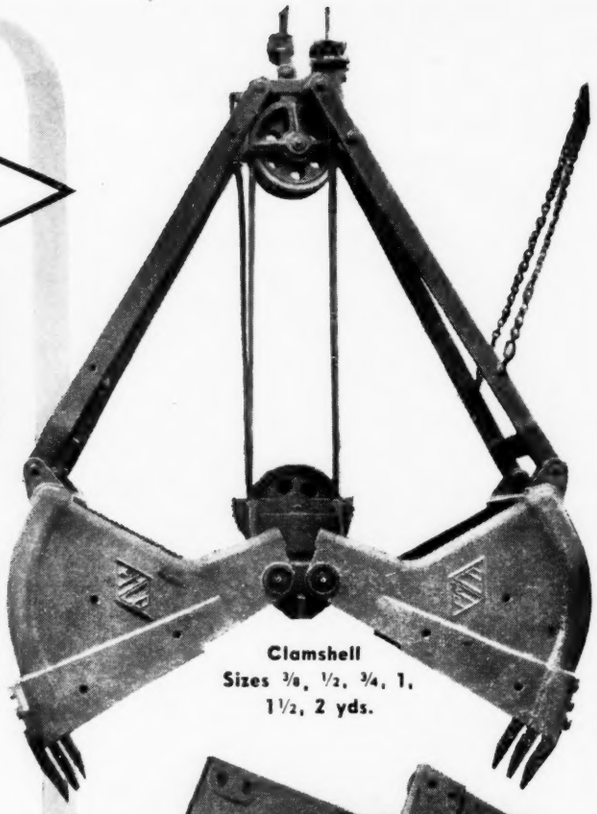
PMCO

America's Most Complete Line of Material Handling Buckets

All purpose -

- **SHOVEL**
- **PULLSHOVEL**
- **DRAGLINE**
- **CLAMSHELL**

• FRONTS, BOTTOMS, SCOOPS and TEETH are 14% manganese steel developing tensile strength up to 120,000 p. s. i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.



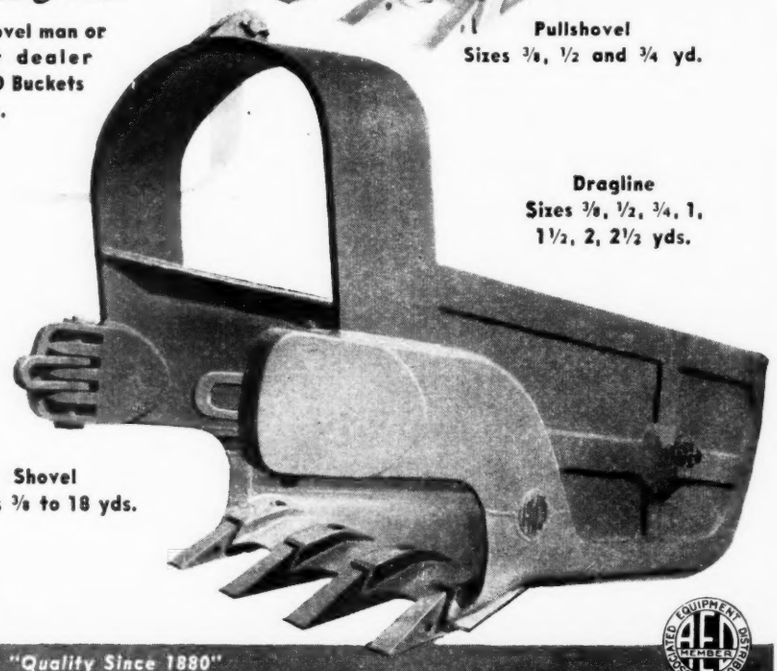
Clamshell
Sizes 3/8, 1/2, 3/4, 1, 1 1/2, 2 yds.

Pullshovel
Sizes 3/8, 1/2 and 3/4 yd.

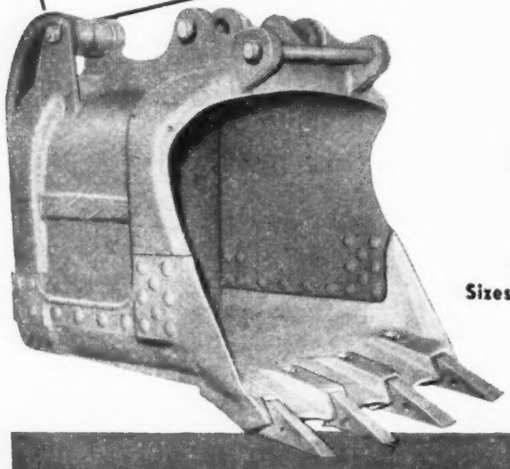
Experience Counts

See your shovel man or equipment dealer about PMCO Buckets and Dippers.

On the 1/2 yd. and 3/4 yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable — a great advantage to operators.



Dragline
Sizes 3/8, 1/2, 3/4, 1, 1 1/2, 2, 2 1/2 yds.



Shovel
Sizes 3/8 to 18 yds.

"Quality Since 1880"

PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

GROUND GRIP

WHEN other tires quit — gum-up and spin — the Firestone Ground Grip keeps driving — maintains maximum traction in loose fill or over unimproved haul roads. Specifically designed for the drive wheels of earth-moving trucks and equipment, this special purpose tire has proved itself to be the greatest traction tire ever developed for off-the-highway work. The connected triple-braced tread bars pack down loose earth as they dig into the ground. Flexing action of the continuous tread design forces dirt from between the tread bars — keeps them clean, ready for the next traction bite.

Firestone Ground Grips on the drive wheels of your off-the-highway equipment out-pull any other tire ever built, cut your operating time — and costs — to the minimum.

For the best in music, listen to the "Voice of Firestone" every Monday evening over NBC network.

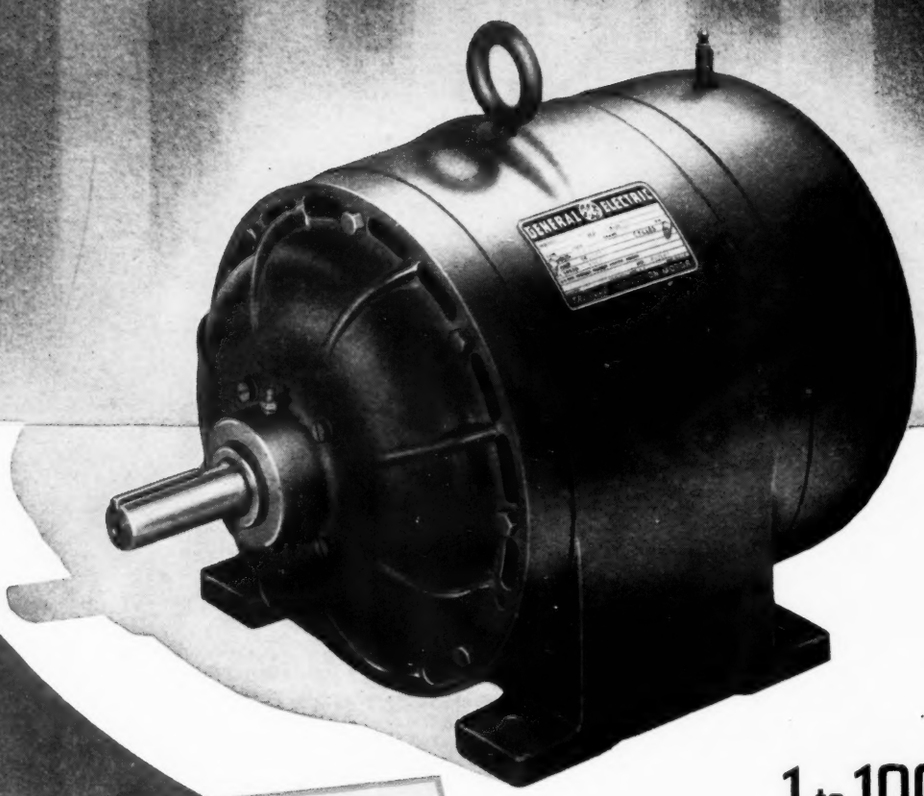
ALL NON-SKID
Designed to give maximum flotation to free-rolling wheels on drawn earth-moving scrapers, wagons and buggies.

ROCK GRIP EXCAVATOR
Delivers extra traction plus stamina in toughest trucking operations, quarrying, logging, construction work, ore and coal strip mining.

Copyright, 1946, The Firestone Tire & Rubber Co.

Firestone OFF-THE-HIGHWAY TIRES

GENERAL ELECTRIC Announces



1 to 1000 hp

COMPLETE ENCLOSURE
FOR PROTECTION
AGAINST DIRT, DUST,
AND WEATHER

NEW

Totally Enclosed

TRI/CLAD MOTORS

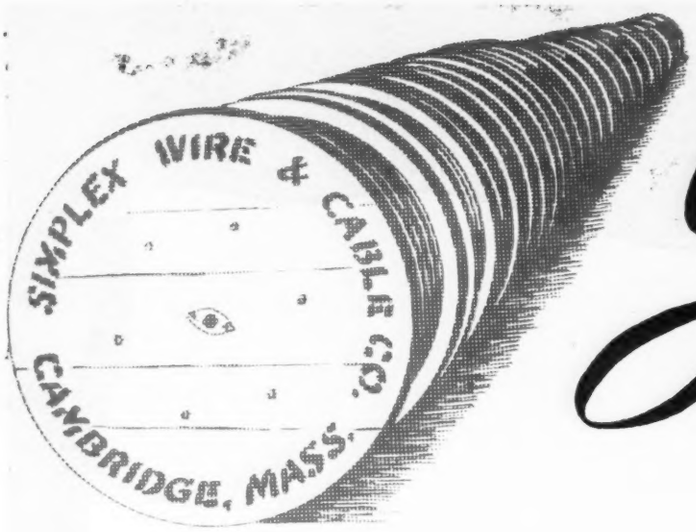
REG. U.S. PAT. OFF.

In 1940, G.E. introduced the Tri-Clad open motor—with emphasis on the feature that industry wanted most in a motor, *protection.* Since then, more Tri-Clads have gone into service than any other integral-horsepower motor.

Today, we are ready with a new line of Tri-Clad motors—*totally enclosed, fan-cooled motors*—built on Tri-Clad design principles in both standard and explosion-proof types.

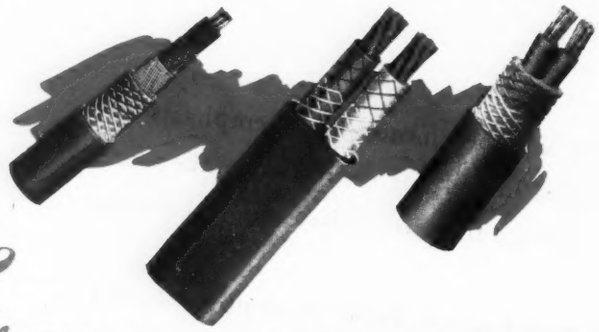
We believe that these are industry's most dependable motors. They are designed specifically for use in many adverse atmospheres—in iron dust, outdoors, in hazardous areas, and chemical atmospheres. Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them economical motors for use on almost every job. *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC



Simplex

Tirex MINING MACHINE CABLES . . . . .

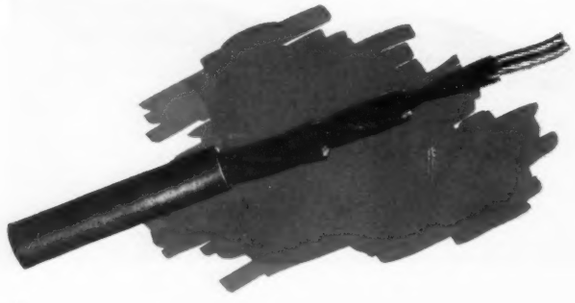


Here are the cables that really make for greater mining efficiency. TIREX Mining Machine Cables can be either flat twin, concentric, or multi-conductor round, depending upon the need. Like all TIREX Cables these are protected by the flame-resisting TIREX Selenium Rubber Armor.

Tirex LOCOMOTIVE CABLES . . . . .

Simplex-TIREX Locomotive Cables are made to withstand the difficult working conditions which are found in all types of mining locomotive service. TIREX Locomotive Cable has the stamina built into it to last for a long time even under the most adverse conditions. Steel strands are included in the conductor for added strength and the jacket is the famous flame-resisting Selenium Rubber Armor.

Tirex SHOT FIRE CORDS . . . . . .



Greater mining efficiency is assured by using the long wearing, safe TIREX Shot Fire Cords. They are protected by Selenium Rubber Armor and combine unusual wearing qualities with safety, light weight and small diameter. These cords were designed for rough work in damp or wet places and they are not affected by acids, gases or oils, which are usually found in ordinary mining work.

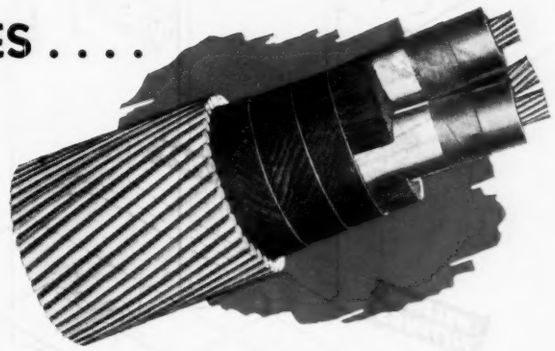
Cables for Greater MINING EFFICIENCY

Anhydrex MINE TELEPHONE CABLES . . . .

ANHYDREX Mine Telephone Cables, either as flat twin or round, will very greatly increase your mine efficiency by enabling you to talk dependably with any part of your mine. Simplex-ANHYDREX Mine Telephone Cables combine the unusual properties of low water absorption insulation with a hard service rubber jacket. This jacket will withstand usual mine hazards.

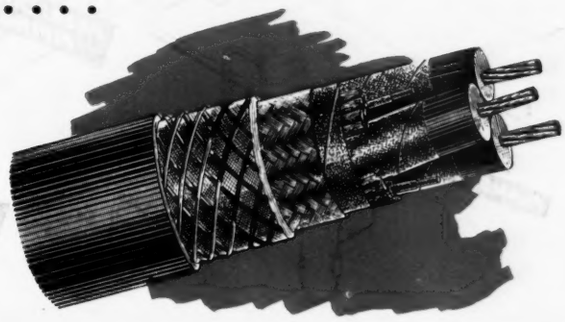
Simplex BORE HOLE CABLES . . . .

Simplex cables for bore hole service can be designed having either rubber or varnished cambric insulation. They are usually protected and supported by steel armor wires. Simplex Bore Hole cables are custom made to fit the conditions where they are to be installed.



Tirex TRAILING CABLES . . . . . .

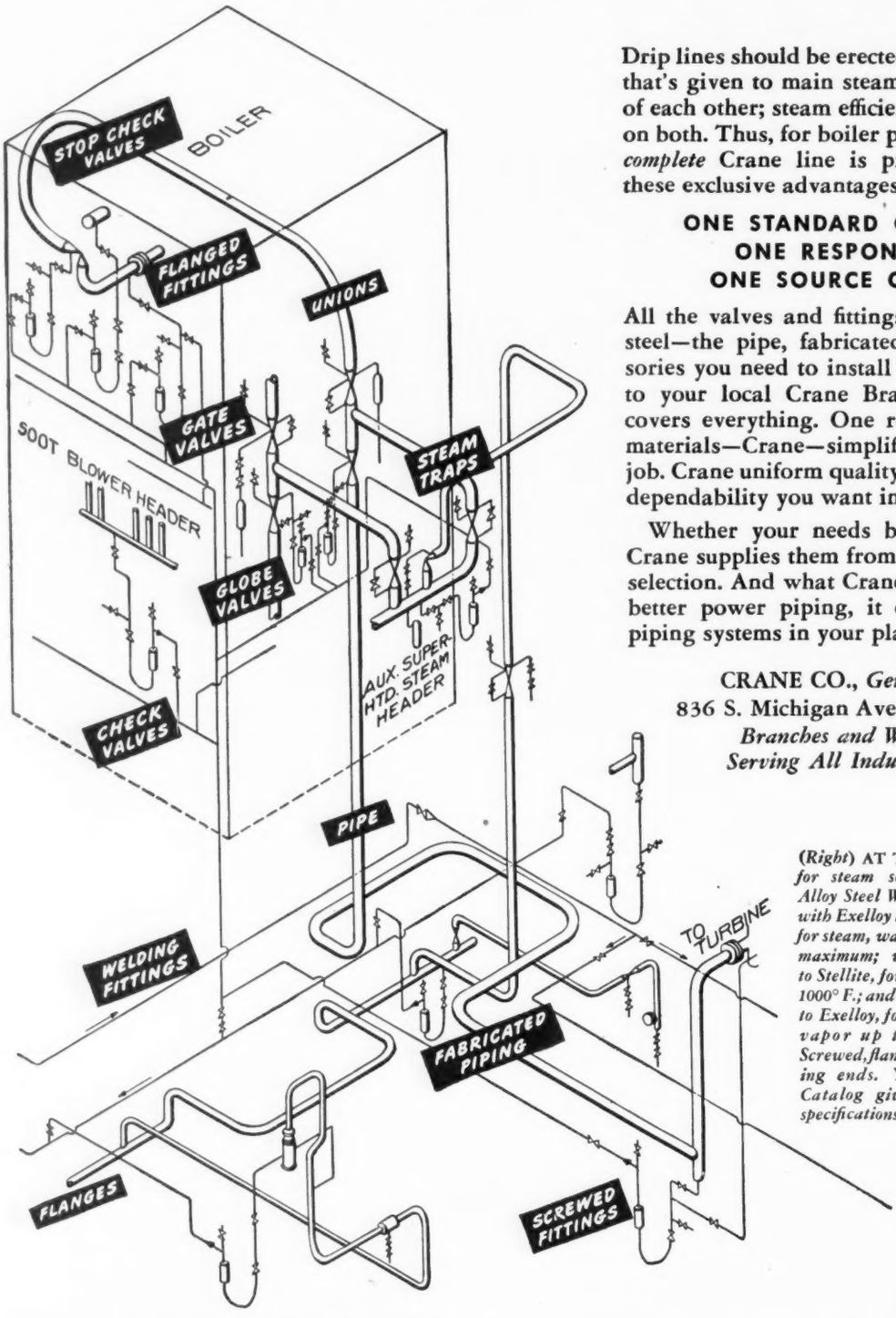
Simplex-TIREX Trailing cables increase the efficiency of strip mining service because they remain in service for much longer periods than would ordinarily be expected. The tough Selenium Rubber Armor which protects all TIREX cables and the unique construction of TIREX cables combine to make a cable that has long life and gives trouble-free service under the most adverse conditions. TIREX Trailing cables can be made in a great many styles and types to suit the individual application.



Simplex Mining Cables

SIMPLEX WIRE & CABLE CO.
79 SIDNEY STREET
CAMBRIDGE 39, MASS.

All Drip and Drain Piping
...from the Complete Crane Line



Drip lines should be erected with the same care that's given to main steam lines. They're part of each other; steam efficiency depends equally on both. Thus, for boiler piping especially, the *complete* Crane line is preferred because of these exclusive advantages:

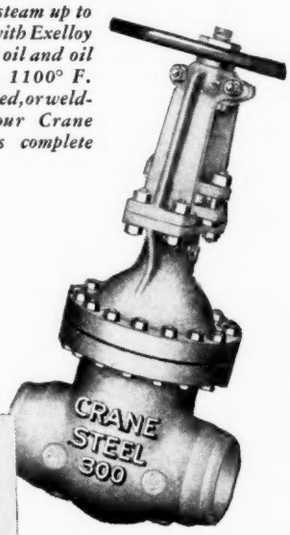
ONE STANDARD OF QUALITY
ONE RESPONSIBILITY
ONE SOURCE OF SUPPLY

All the valves and fittings, in brass, iron, or steel—the pipe, fabricated piping and accessories you need to install a boiler—one order to your local Crane Branch or Wholesaler covers everything. One responsibility for all materials—Crane—simplifies and speeds the job. Crane uniform quality assures the uniform dependability you want in all boiler lines.

Whether your needs be usual or unusual, Crane supplies them from the world's greatest selection. And what Crane can do to give you better power piping, it can also do for all piping systems in your plant.

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers
Serving All Industrial Areas

(*Right*) AT THE HEAD OF THE CLASS *for steam services — Crane 300-pound Alloy Steel Wedge Gate Valves. Supplied with Exelloy to No. 49 Nickel Alloy seating for steam, water, gas or air up to 850° F. maximum; with Stellite to Stellite, for steam up to 1000° F.; and with Exelloy to Exelloy, for oil and oil vapor up to 1100° F. Screwed, flanged, or welding ends. Your Crane Catalog gives complete specifications.*



EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

CRANE

FOR EVERY PIPING SYSTEM

a NEW DAY for Mining

. . . IN THE ALLIS-CHALMERS 1946 LINE-UP OF EQUIPMENT*

MODEL A-D MOTOR GRADER

— 75 Diesel, h.p. engine . . . more traction, more clearance . . . a full range of blade positions for handling complete grading of haul roads — slopes, ditches, surface.

2-CYCLE DIESEL TRACTORS

— now a choice of four models, ranging from 60 to 132 drawbar h.p. — HD-7, HD-10, HD-14, HD-14C (Torque Converter Tractor) — with matched allied equipment — cable and hydraulic bulldozers and scrapers . . . snow plows, winches, rippers.

MODEL W-SPEED PATROL

— for sweeping coal, maintaining haul roads . . . performs at fraction of usual cost—low original cost, low operating cost.

Up-to-the-minute in design!

Modern in performance!

A new high in productivity . .

a new ease in operation . .

a new low in grading cost.

It's a New Day for miners . . . with Allis-Chalmers power!

MODEL I-B WHEEL TRACTOR

— the ideal, economical unit for countless pulling and pushing jobs—especially popular for hauling work, sweeping, bulldozing loose materials.

POWER UNITS

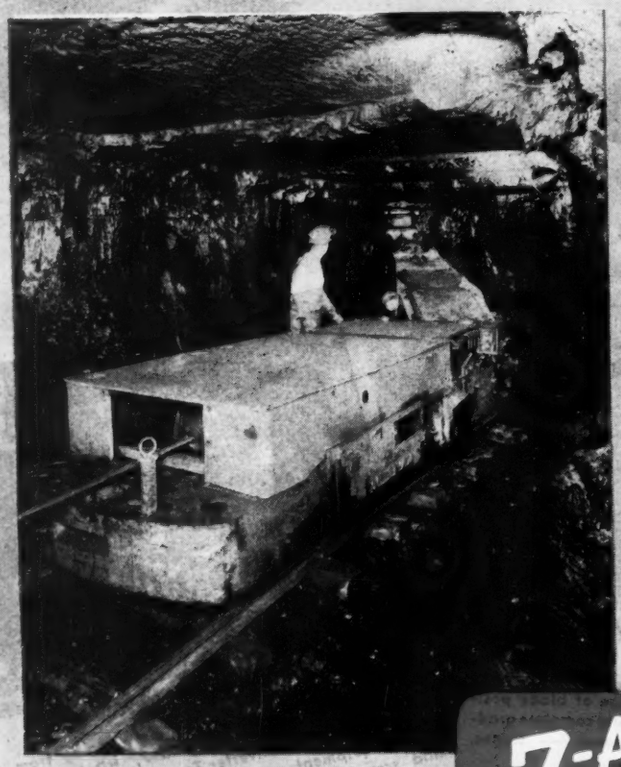
— for pumping water, powering hoists, conveyors, compressors, screens, welders, generators and other equipment. Available with various accessories to fit the application. 5 sizes. Choice of fuels.

* MORE MACHINES ARE TO BE ADDED . . *Watch for Announcements!*

ALLIS-CHALMERS

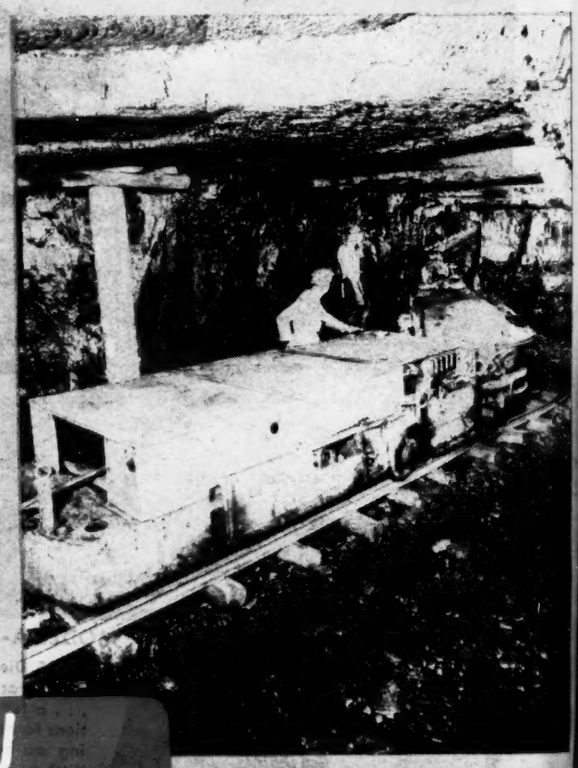
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

SULLIVAN *Coal cutters*



Top-cutting with the 7-AU Universal Coal Cutter.

7-AU UNIVERSAL



The 7-AU will make a center, side or angle shear cut.

• The 7-AU track cutter because of its extreme reach has many advantages. The great reach permits more practical use of caterpillar mounted loading machines. With this type of loading, one laying of track for each two cuts is often sufficient. Used in conjunction with track type loading machines the unavoidable and annoying delays in and due to track laying are less apt to hinder cutting operations and production. Owners say "Buy the 7-AU for fast mechanical loading, better roof control and a higher percentage of lump coal."

Sullivan 7-AU licensed under patents to E. C. Morgan Nos. 170691, 170692, 1707132, 1953325, 1953326.

OTHER PRODUCTS
Mobile Loaders
Shuttle Cars
Conveyors
Fans — Blowers
Hoists — Slushers
Air Compressors
Rock Drills — Core Drills

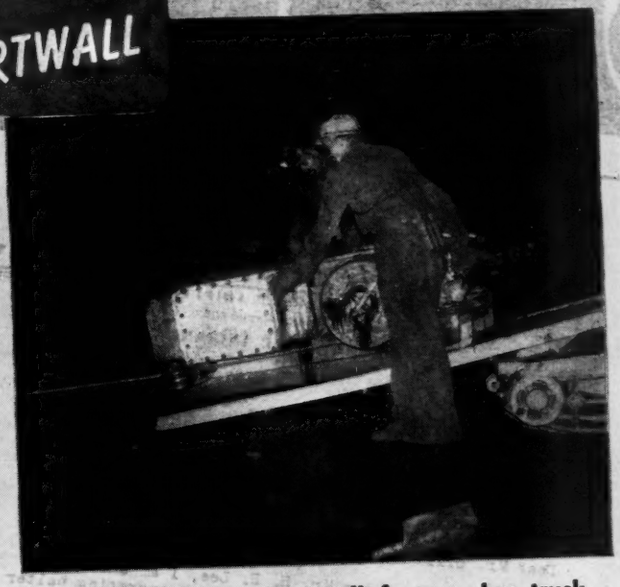
SULL

Modern Equipment for

. . . ARE REALLY *Cost cutters!*

These Sullivan cost cutters have established reputations for proven performance and dependable operation, *but that's not all.* They have plenty of power for deep cuts and fast feeds, and the capacity to keep well ahead of high tonnage loaders so that there is no possibility of delay in the operating cycle as a result of the loader having to wait for the cutter. Sullivan cutters will conserve manpower and *lower the cost of cutting coal* . . . The proof lies in constant repeat orders from nationally known coal companies. The complete story is of dollars and cents interest to every operator. Ask the nearest branch office to tell it to you. Literature on request. **Sullivan Division, Joy Manufacturing Co., Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.**

Undercutting with 7-B Shortwall. Operators like this machine.



Unloading a 7-B Shortwall from a Joy truck. It's easy to handle.

• The Sullivan 7-B shortwall coal cutter offers SPEED through an exclusive arrangement of lever controlled rope drums, POWER with a 50 H.P. slow speed motor and DURABILITY because of splash lubrication, alloy steel gears and anti-friction bearings.

10 RU Trackless Coal Cutter

Rubber-tired universal built 100% for trackless mining. Licensed under the patents to E. C. Morgan Nos. 1706961, 1706962, 1707132, and 1953325

IVAN

Modern Coal Mines

SALES OFFICES
Birmingham, Ala.
Butte, Mont. • Chicago, Ill.
Dallas, Texas • Denver, Colo.
El Paso, Texas
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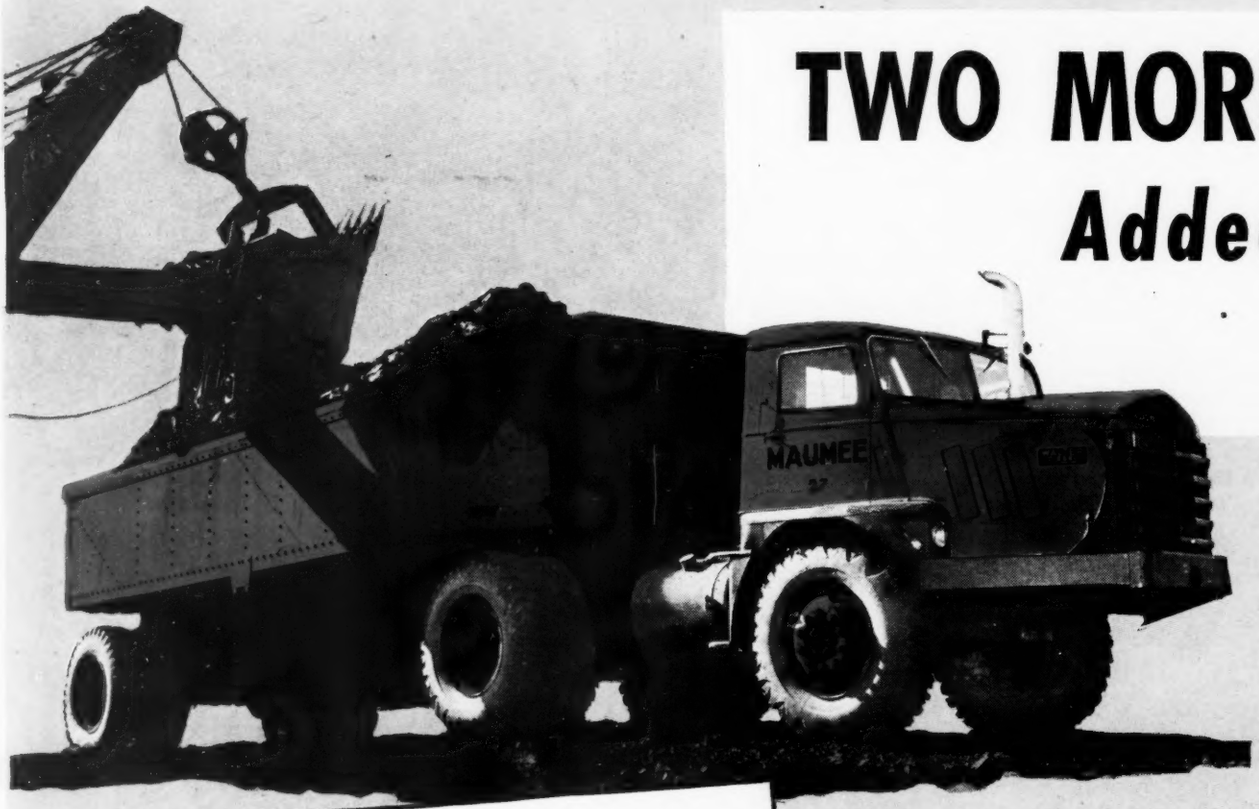
San Francisco, Calif.
Salt Lake City, Utah
Scranton, Pa. • St. Louis, Mo.

TWO MORE Added



1946 Two new model ACVD Walter Tractor Trucks with 200 h.p. Diesel engines, hauling 30 ton trailers.

THE MAUMEE COLLIERIES COMPANY
COAL MINERS AND SHIPPERS
TELEPHONE CRAWFORD 2357
TERRE HAUTE, INDIANA

Jasonville, Indiana
March 14, 1946

Mr. A. W. Gill
Thoma & Gill
1919 Broad Street
Newark 2, New Jersey

Dear Mr. Gill:

At the request of our Mr. H. B. Lee, I am answering your letter of March 2. We have been operating Walter Trucks since September of 1937 at our mine #17, near Clay City, Indiana.

At this mine, we have encountered very severe haulage conditions at times, due to bad weather combined with high percent grades and uneven road surface in the pits.

We have found the Walter Four Wheel Drive trucks able to handle these conditions unaided, where our 2 x 4 and 4 x 6 wheel trucks could not without assistance. This is due to very good distribution of weight and tractive effort of the Walter Trucks. These same features also enable us to get excellent tire life resulting in low tire cost per mile.

The short wheel base of these units gives a short turning radius which is very desirable in our operation. We have found the workmanship, design and material of the Walter Trucks to be of high quality throughout. We hope this will help you and if there is anything else that we can do, let us know and we will be glad to help.

Yours very truly,
Joe Buchan
Superintendent of Motor Vehicles

READ WHY

- Hauls in severe conditions—bad weather—high grades—uneven road surfaces, without assistance.
- Good weight distribution and high traction
- Low tire cost per mile
- Short turning radius due to short wheelbase
- High quality workmanship, design and material throughout

WALTER MOTO
1001-19 Irving Avenue

WALTER TRACTOR TRUCKS
by Maumee Collieries!

Five Walter Tractor Trucks Now Operating At Mine No. 17, Clay City, Indiana

MAUMEE COLLIERIES COMPANY is noted for the efficiency of its operations. So this re-order of Walter Tractor Trucks is real evidence that they are the most rugged, productive trucks for difficult strip mine hauling. After nine years, the original Walter Tractor Trucks are still hauling over the severe six mile round trip.

Walter Tractor Trucks excel in tough going because the Walter Four Point Positive Drive provides 100% traction in all wheels. Three automatic locking differentials proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant. When equipped with 275 h.p. Diesel or 300 h.p. Butane engine, Walter Tractor Trucks haul tandem trailers of 60 ton payload capacity. Write for detailed literature.

1937 Two model FBRT Walter Tractor Trucks, with 20 ton trailers, still on the job.

1940 Model ADVD Walter Tractor Truck, with 25 ton trailer, still operating.

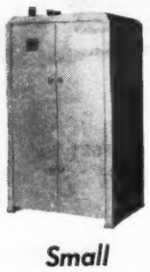
TRUCK COMPANY
Ridgewood 27, Queens, L. I., N. Y.

Don't let Low Power Factor ... kill YOUR

"Saved $2,000 in the first 4 months!" reports one mine operator after he had installed G-E pole-type Pyranol capacitors at a cost of $5,000.

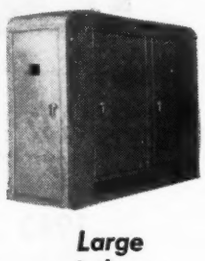
Enclosed Capacitor Units

Intended primarily for individual-motor or small-load application. Available in ratings from 0.5 to 7.5 kvar, 230 volts; 1 to 15 kvar, 460 and 575 volts—for single-, two-, or three-phase applications.



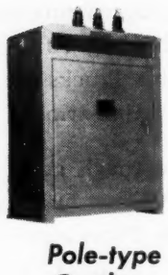
Small Indoor Equipments

These units occupy little space and can be suspended overhead, if desired. Available in single-, two-, or three-phase ratings up to 90 kvar, 230 volts; 180 kvar at 460, 575, 2400, 4160, 4800 and 7200 volts.



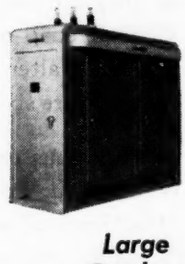
Large Indoor Equipments

Particularly desirable where one large block of capacity is desired. Available in ratings up to 630 kvar, 230 volts; up to 1260 kvar, 460 and 575 volts; and up to 2520 kvar, 2400 to 13,800 volts incl. Supplied either with or without circuit breakers.



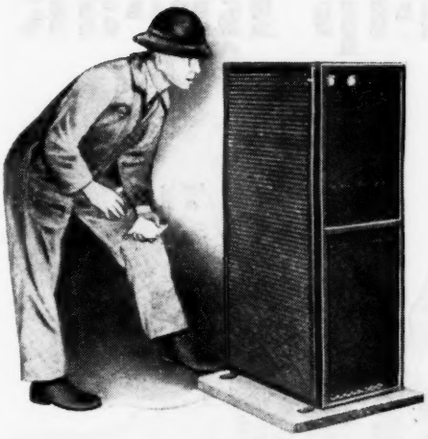
Pole-type Outdoor Equipments

Each unit has a completely weatherproof, all-welded steel housing suitable for either pole or base mounting. Designed for application to primary circuits of 2400, 4160, 4800 and 7200 volts in ratings up to 180 kvar, single-, two-, or three-phase.

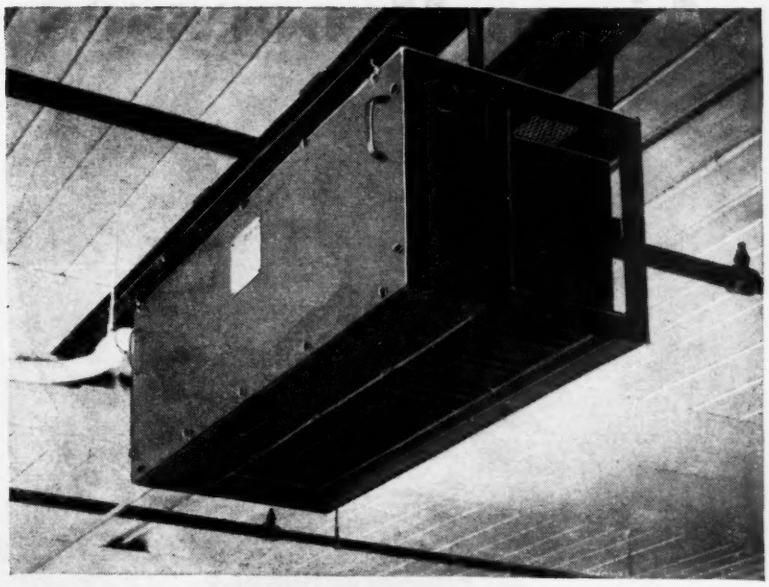


Large Outdoor Equipments

This type provides large blocks of power-factor-improvement capacity. Completely weatherproof. Supplied either with or without circuit breakers. Available in kvar, phase, and voltage ratings which duplicate large indoor equipments.



In less than 2 years, this mining company had saved enough on its power charges to pay for its G-E capacitor installation.



Ceiling-mounted, dust-tight G-E capacitors save valuable floor space and can operate at high ambient temperatures.

MECHANIZATION GAINS!

★ POWER FACTOR—THE CRITERION OF "WORKING" POWER WHICH YOU CAN IMPROVE WITH G-E PYRANOL CAPACITORS TO SECURE LOWER POWER COSTS AS WELL AS A HIGH RETURN ON YOUR INVESTMENT

● The economies of mechanical mining can be seriously affected by a low power factor and the resulting high power costs. This needn't happen in your case—if you take advantage of the savings made possible by proper capacitor utilization. If you buy power from a utility and your contract contains a power-factor adjustment or kva-demand clause, capacitors can reduce your monthly bill by giving you more "working" power for every dollar you spend.

If you operate your own power plant, capacitors enable your generators to deliver more "payload" kilowatts—up to their maximum rating. In either case, they improve your voltage, reduce power losses, and help prevent system overloading. Very often, too, a capacitor installation permits the addition of more motors or other electrical equipment to a "fully loaded" system without the expense of additional feeders, transformers, or generators.

Users tell us that G-E capacitors return from 57 per cent to 120 per cent of their original cost every year. In other words, they pay for themselves many times over. Reliability of operation, of course, is essential before you can realize any worthwhile savings and G-E Pyranol capacitors are noted for the care and precision used in their manufacture. They're non-inflammable, hence less expensive to install. They are smaller than other types, require less space. And they have stable operating characteristics that assure long life.

Applying capacitors to secure maximum savings in mines, on surface properties, and in preparation plants requires careful study of your existing and anticipated circuits and power demands. General Electric engineers, because of their wide experience in this field, are able to render this service. Why not get in touch with the G-E office nearest you? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

PYRANOL Capacitors

GENERAL ELECTRIC

657-50-148

Airco Processes Help Break

CA

AIR REDUCTION
60 EAST 42nd STREET
NEW YORK 17, N. Y

Please send me the following material:

.....

.....

.....

FIRM_____

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE____

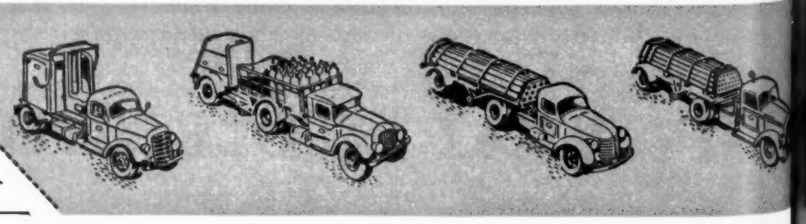
MEETING the heaviest demands in their history in the face of the most serious manpower shortage and most stringent restrictions on production of equipment and replacements called for the greatest ingenuity on the part of mining men.

Modern Airco oxyacetylene and electric arc processes described on these pages played an important part in the industry's miraculous accomplishments. They helped to restore worn and obsolete equipment to use and to build new equipment not obtainable from war-converted suppliers.

So helpful have these processes proved that they will, no doubt, play an important part in future mining operations.

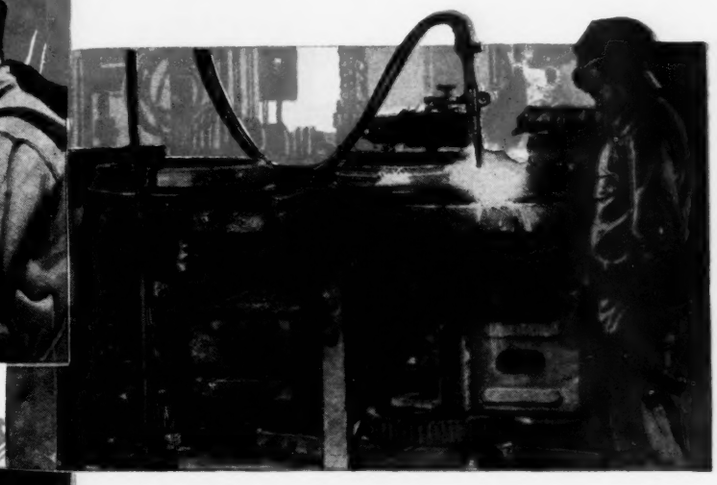
If you are unfamiliar with any of the applications listed in this advertisement, Airco's Technical Sales Division will be glad to furnish complete information and assist you in applying them to your own operations.

Electric Arc Welding. Airco's famous "Hornet" and "Wasp" D.C. Arc Welders and "Bumblebee" A.C. Welders serve many of America's mines in building up and restoring locomotive tires (illustrated), loading machine truck wheels, rock crusher heads, etc. They are also widely used for rail bonding, equipment repairs, general fabrication and structural welding.



Mine Production Records

Gas Welding and Brazing. Oxyacetylene gas welding and brazing have proved their worth in restoring to service broken parts such as the drive pinion (illustrated) when replacement has been difficult or impossible. Gas welding and brazing have also proved important aids in the construction of equipment and parts.



Machine Gas Cutting serves many purposes on mine properties. In the illustration, false and sharp flanges are quickly removed from mine locomotive wheels. With a special set up, Airco cutting machines are also used in trimming worn rails. Airco Radiagraph portable cutting machines are also useful for accurately cutting steel plate for applications such as car body repairs, car and locomotive parts, etc. Send for catalogs ADC-614 and 627.

Hand Flame Cutting quickly restores worn equipment to service by speeding the removal of damaged parts. It is also useful for many small or occasional cutting jobs, for dismantling steel structures and for preparing scrap for shipment to the mills.

Hardfacing — the application of special alloys to wearing surfaces by the electric arc or oxyacetylene process—restores the usefulness and multiplies service life of many types of mining equipment such as drill bits, clam-shell and dipper bucket edges, crusher parts, etc.

OTHER AIRCO OXYACETYLENE AND ELECTRIC ARC PROCESSES SERVING THE MINING INDUSTRY

- Flame Cleaning of Steel Surfaces
- Flame Hardening
- Flame Heating for Straightening or Bending
- Flame Oxygen Lancing
- Low Temperature Brazing
- Pipe Welding (Gas and Arc)
- Structural Welding
- Rail Bonding

AIR REDUCTION

AIRCO

General Offices • 60 East 42nd Street, New York 17, N. Y.

In Texas • Magnolia Airco Gas Products Co. • General Offices • Houston 1, Texas

Offices in All Principal Cities

Represented Internationally By Airco Export Corporation

NOW...You Can Have PROMPT DELIVERY on Morrow Screen Plates!

MORROW is now prepared to make deliveries fast on all screen plates within the range of standard dies shown in Morrow Bulletin No. 70.

Not all types of steel and non-ferrous metals are now available, but when they are not, in many cases satisfactory substitution can be made.

FOR DETAILED INFORMATION

send for the new Morrow Bulletin No. 70. Write The Morrow Manufacturing Company, 1940 Ford Blvd., Wellston, Ohio. Division the Wacker Corporation.

MECHANIZE WITH MORROW

COAL WASHERS • WEIGH PANS • FEEDERS • DUMPS
BINS AND BIN GATES • FLANGED LIP SCREENS
CONVEYORS • LOADING BOOMS • SHAKING SCREENS
VIBRATING SCREENS • CAR HAULS • PICKING TABLES
SETTLING TANKS • ELEVATORS • CAR RETARDERS
PERFORATED METAL SCREENS • STEEL STRUCTURES

The Rocky Road to Dublin

was a cinch compared to this!

There's no silky six-lane highway where this Mack earns its keep. One of seven Mack Trucks working in the stripping pits of the Coal Rains Coal Company, it leads a rough-and-tumble life.

It's *smash!* . . . as ten tons of coal are dumped into the waiting truck. It's twist and strain and scramble over the ridges and through the ruts. Then 2,000 feet up a steep ramp—two miles more to the breaker. Then back—and over again. Two shifts a day. Six days a week.

Macks show what they're made of on battering jobs like this. They stand up and take it smiling. Why not make your next truck a Mack, and see what performance a really tough truck can deliver?

Mack Trucks, Inc., Empire State Building, New York City. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE

Performance Counts!

Now —
Let's Strengthen the Connecting Link!

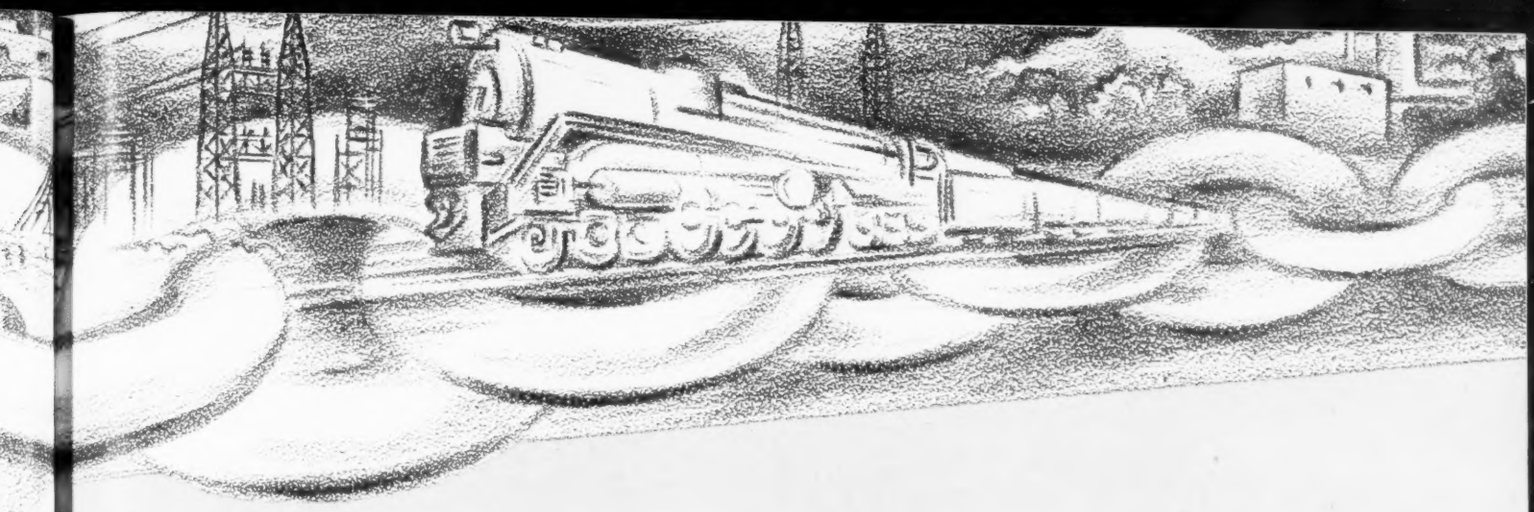
As ensuing statistics so vividly portray, giant forward strides are being made in efficient mechanized-mining methods and equipment. Projected curves of mining efficiency indicate beyond question that an adequate supply of raw coal can be delivered above ground as economically as any unprocessed fuel.

Coal's principal consumers have made comparable progress. Delicately-balanced marvels of efficiency, modern power plants forecast energy-costs to hundredths of a penny. Coke plants stand second to none in efficient processing of coal and its chemical treasure-trove. New locomotives are mobile miracles of increased thermal and mechanical efficiency.

Between Production and Consumption is Preparation—greatest remaining opportunity for progress in product-quality that will make coal impregnable against substitute fuels in tomorrow's competitive markets.

In coal preparation, progress *has* been made. But the *rate of increased output of low-sulfur, low-ash coal is still less than the growth of mechanized mining and improved efficiency-of-use in coal's principal markets.* True, the output of many mines needs a minimum of preparation. But many have yet to achieve the most economical preparation of coal as physically and chemically uniform as any refinery's output!

AMERICAN CYANAMID COMPANY



Do we overstate the opportunities for product-improvement above ground? Not one iota, you will agree once you investigate Heavy-Media Separation.

On a quantity-production basis with unfailing accuracy, Heavy-Media Separation closely duplicates the washability curves. It operates with equal efficiency and economy on any fragmentary materials within a gravity range of 1.25 to 3.40. Within this range, it makes razorsharp separation at any predetermined density and maintains that density continuously within ± 0.01. Yet as feed-coal varies or end-product specification must be changed, the separating gravity can be quickly and easily changed.

Heavy-Media Separation plants can be designed for multiple-product separation from run-of-mine feed in a full size-range to meet any standard of quality. By continuous reclamation, loss of the low-cost separating medium is negligible. Plants can be started or shut down without bank loss of coal, medium or plant efficiency. Equipment is standard, time proved. No unusual skills are required of operating personnel. Labor costs are infinitesimal per ton of coal cleaned. Capital costs permit serious consideration on any seam worthy of modern mechanized-mining methods and equipment.

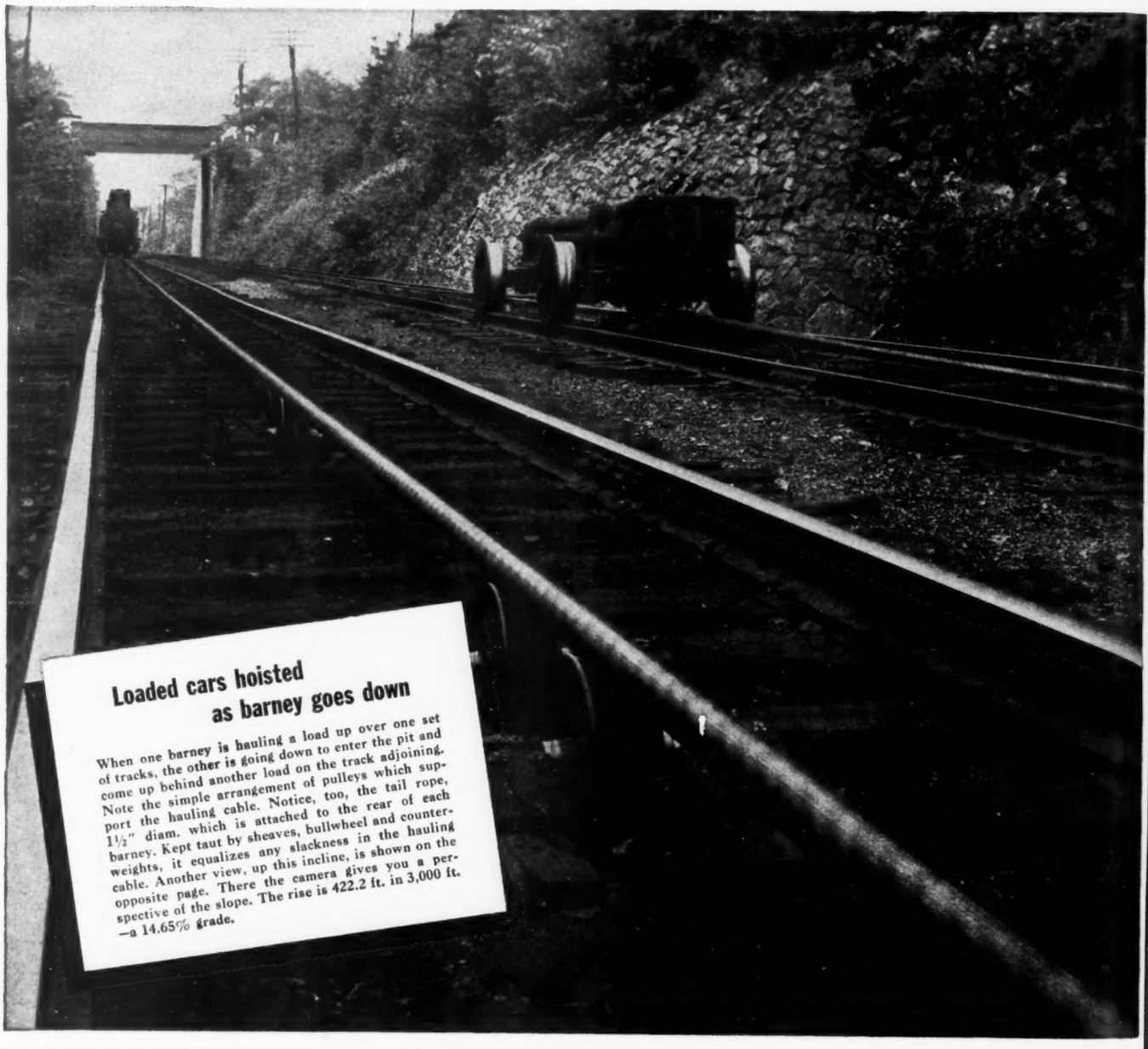
We sincerely believe Heavy-Media Separation to be the best answer to the competitive demands for uniform low-sulphur, low-ash coal. Our conclusions are based on 40 million tons of experience (much of it on materials far harder to beneficiate than coal), on carload test-results for many leading coal companies and on the expressed viewpoints of outstanding coal operators.

We are prepared to demonstrate the efficiency and economy of Heavy-Media Separation on your coal by continuous-unit tests of carload lots, and to give your engineers the benefit of our experience in the design and operation of Heavy-Media Separation units.

AMERICAN CYANAMID COMPANY PRODUCTS

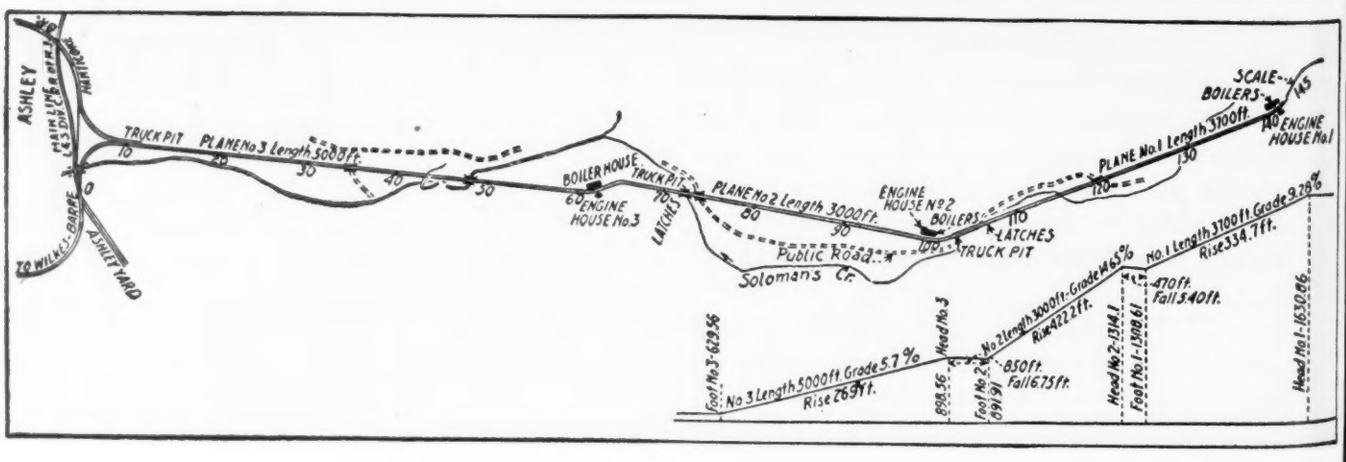
30 Rockefeller Plaza, New York 20, N. Y.

Hauling 27,972,495 tons of freight



Loaded cars hoisted as barney goes down

When one barney is hauling a load up over one set of tracks, the other is going down to enter the pit and come up behind another load on the track adjoining. Note the simple arrangement of pulleys which support the hauling cable. Notice, too, the tail rope, 1½" diam. which is attached to the rear of each barney. Kept taut by sheaves, bullwheel and counterweights, it equalizes any slackness in the hauling cable. Another view, up this incline, is shown on the opposite page. There the camera gives you a perspective of the slope. The rise is 422.2 ft. in 3,000 ft. —a 14.65% grade.



over the famous Ashley Planes

AMERICAN EXCELLAY PREFORMED TIGER BRAND Wire Rope sets records for top performance over 100 year period

WILKES-BARRE in the heart of the Anthracite field is three miles from Ashley, Pa., where the Ashley Planes are located. From Ashley to the mountain top it is 1,000 feet up. The grade of the famous Ashley Planes is such that a locomotive cannot negotiate it economically. The alternate route around the mountain is 12.41 winding miles of heavy grade over which a locomotive can haul a small tonnage train at slow speed. With brilliant foresight the engineers who planned the Ashley Planes 100 years ago, chose to do it the hard way. They proposed to haul freight cars up Solomon's Gap, on three inclined planes—*by wire rope.*

As revolutionary as this project must have been in 1843, the remarkable fact is that repeated tests prove it to be more economical than the longer route, even today. Under twenty-four hour operation, hauling an average of one million tons of coal, oil and mixed freight per month—this cable-hauled railroad equipped with about 100 tons of wire rope reduces transportation costs very materially.

Best visualized by the profile reproduced at left, the Ashley Planes, now operated by the Central Railroad of New Jersey, consist of three inclines of 5.7%, 14.65%, and 9.28% grade respectively. The total rise is 1,035.9 ft. up which 35 to 45 cars are hauled hourly at from 12 to 30 mph.

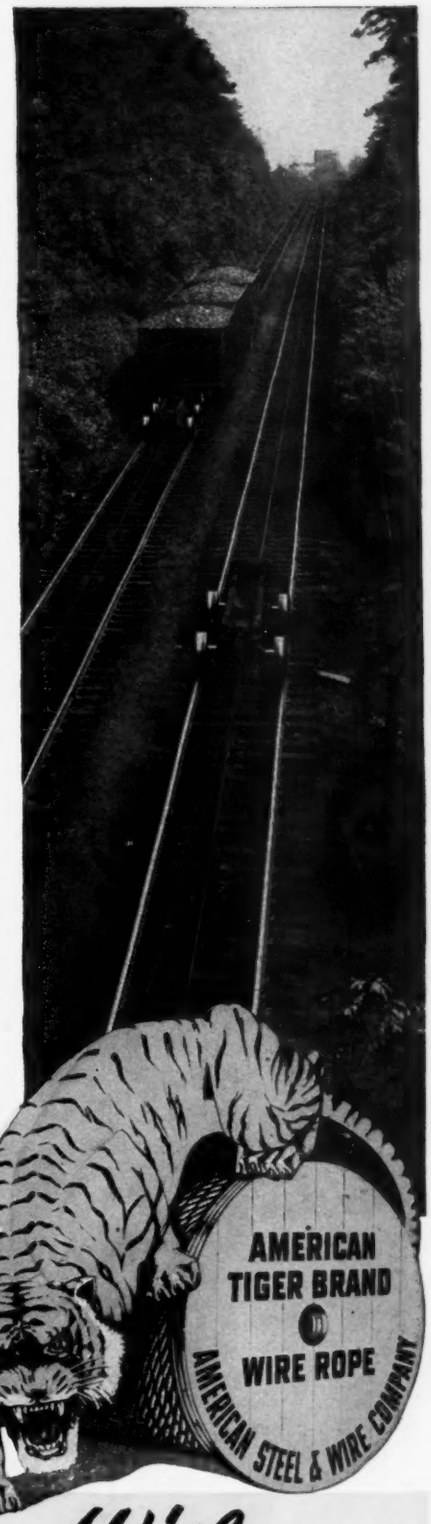
Each plane is a self-contained unit. It consists of a double track (with a truck pit at the foot of each track), and is equipped with its own hauling cable and two cable trucks or "barneys". A power house with hoisting engine at the head of each plane furnishes the motive power.

The hauling cable (2½" diameter on the top and bottom planes, 2¾" diameter on the middle plane with the heaviest grade) passes from one barney up the plane over supporting pulleys, then around 24-ft. diameter twin traction drums, then out through the bottom of the power house and back to the barney on the parallel track.

Close check is kept on the life of these hauling cables, and is measured in terms of tonnage hauled. We believe it significant that during the years when the planes were under full wartime capacity operation, and the equipment was being worked to the limit, American TIGER BRAND Excellay Preformed Wire Rope ran up the highest tonnage performance ever recorded! 19,804,642 tons on the No. 2 plane; and 27,972,495 tons on the No. 3 plane.

TIGER BRAND Excellay Preformed Wire Rope installed on the No. 3 plane in November 1943 has to date hauled 27,972,495 tons and is still in excellent condition. The performance of these ropes continues to break previous records.

These figures — substantially better than the former best with other wire rope used—speak for themselves as proof of the superior stamina, greater ruggedness and better service TIGER BRAND delivers, wherever used.



AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
UNITED STATES STEEL

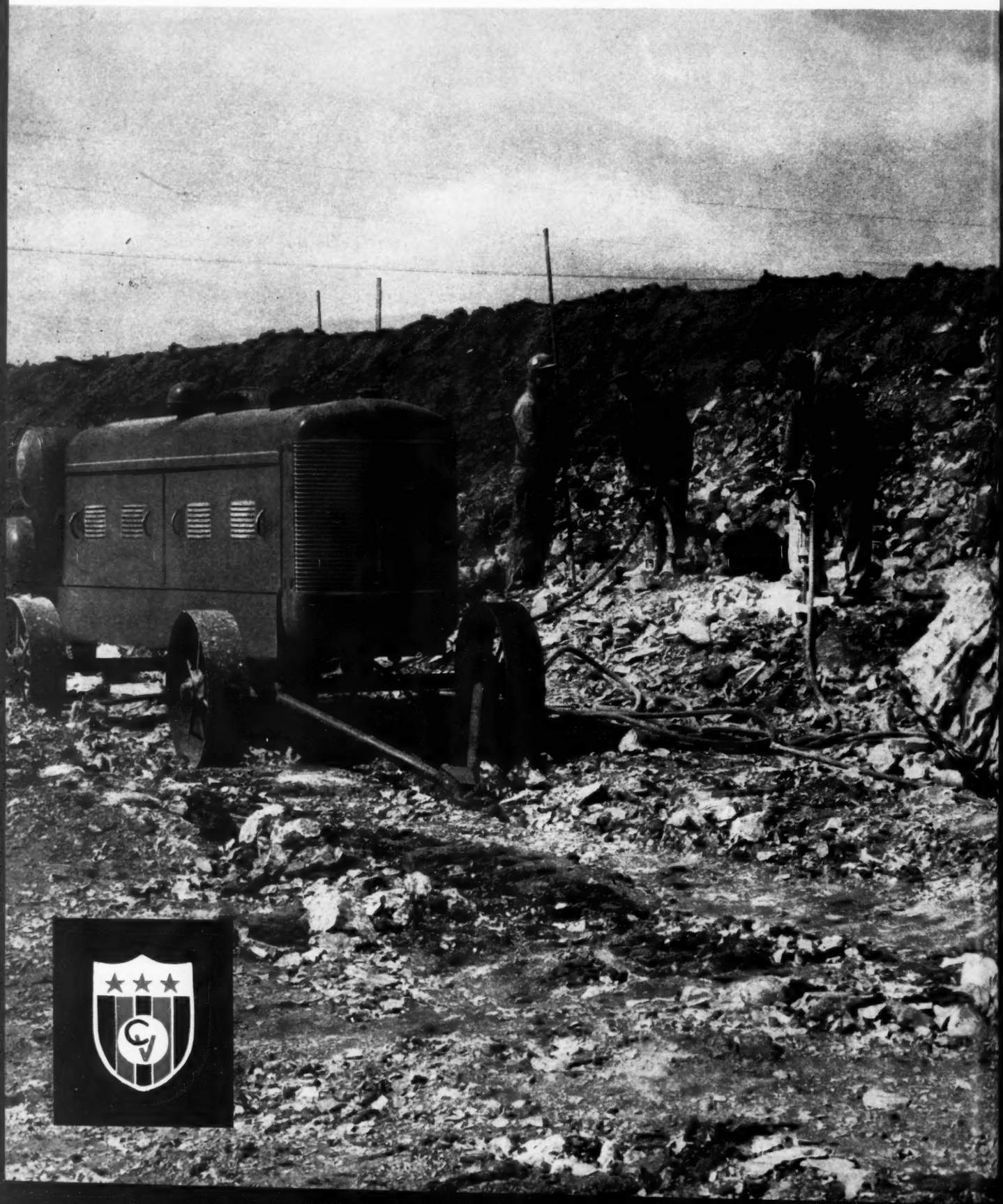
USS AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL

Excellay Preformed

U·S·S AMERICAN
TIGER BRAND *Wire Rope*

Any of Many

SCHRAMM AIR COMPRESSORS



ASSURE YOU *GREATER EFFICIENCY* IN COAL MINING

FOUR REASONS MINES SPECIFY SCHRAMM AIR COMPRESSORS

1. **100% watercooled**
2. **Compact — lightweight**
3. **Mechanical Intake Valve**
4. **Forced Feed Lubrication**

There are many compressed air jobs to be done in coal mines, and there's a Schramm Air Compressor for every job!

Schramm enables compressed air jobs to be done quickly —easily—*efficiently!* This latter, so very important, causes mines to lean toward Schramm. "All the air we want, wherever we need it—giving us greater efficiency in coal mining," mine operators say of Schramm.

Schramm Compressors are available in a long range of sizes—up to 600 cu. ft. displacement in every type of mounting and assembly. All are designed for heavy duty, continuous service, with minimum attention.

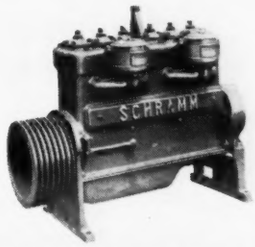
Illustrated on these pages are a few of the many Schramm models. All are easily moved about on the job.

For further details on Schramm Compressors, construction, operating capacities, etc., write today without delay. We will promptly send you, free, a copy of the new, fully illustrated Schramm catalog.

SCHRAMM INC.

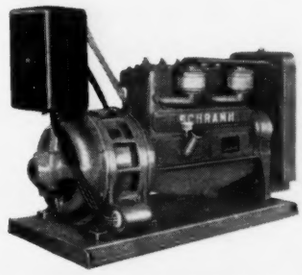
COMPRESSOR SPECIALISTS

WEST CHESTER PENNSYLVANIA



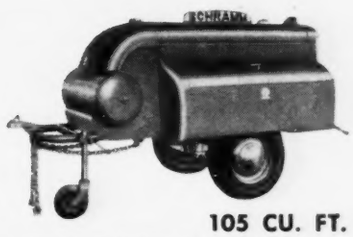
WITH "V" GROOVE PULLEY

Schramm Belt Driven Compressors can be obtained with "V" or flat belt drive suitable for twenty-four hour service and economical operation.



DIRECT DRIVE WITH STARTER AND RADIATOR

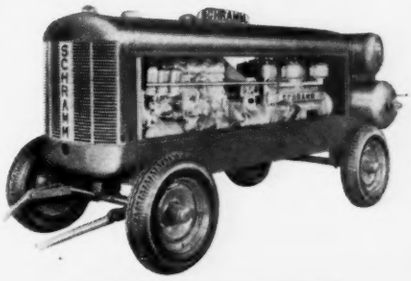
Both compressor and motor are mounted as a single unit on a substantial steel base with starter, radiator, and cooling unit.



105 CU. FT.

WITH SWIVEL TYPE WHEEL

This trailer type mounting is provided with a universal coupling or towing ring for connection to car or truck for hauling at maximum towing speed.



DIESEL ENGINE DRIVEN

Schramm Diesel Engine Driven units are available in sizes ranging from 105 to 420 cu. ft. of actual air.

ROME "60" Two Conductor
Concentric Mining
Machine Cable

ROME "60"
Single Conductor
Locomotive
Gathering Cable

FOR EFFICIENCY PLUS SAFETY

Long experience with Rome "60" Cables has proved to mining men that the design of these tough cables is sound, that materials—conductor, insulation, reinforcement and jacket—are tops, that construction and workmanship are the best. All these characteristics show themselves plainly in records of long, trouble-free service in many mines.

Add to these qualities their flame-proof construction, and you've got a line of cable products that you can rely on for maximum production efficiency plus a safety factor that meets the most stringent regulations.

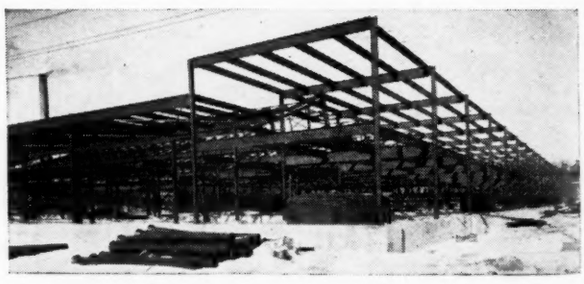
Act 206, a new Law of the State of Pennsylvania, requires that Mining Machine and Locomotive Gathering Cables be **"FLAME RESISTING."**

Rome "60" Mine Cables not only met, but exceeded, the State of Pennsylvania's exacting and rigid test requirements.

Approval No. 105 has been granted by the Department of Mines, State of Pennsylvania and this approval number is molded on the surface of the jacket at three foot intervals. **LOOK FOR THIS SEAL OF APPROVAL.**

Our line includes:

- Parallel Duplex Mining Cables
- Concentric Mining Cables
- Locomotive Gathering Cables
- Portable Drill Cords
- Portable Power Cables
- Control and Signal Cables
- Shot Firing Wire
- Mine Telephone Wire



NEW PLANT—Photo shows steel work for our big, new addition, for increased production and service.

ROME "60"
Parallel (Twin)
Duplex Mining
Machine Cable

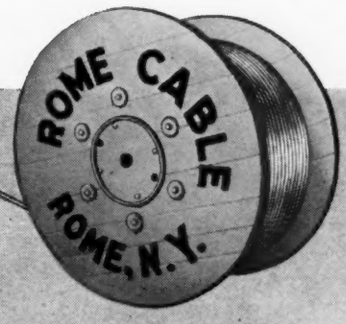
ROME "60" Type W
Portable Power Cable

THEY'RE FLAME-RESISTING

Romey says:-

"Flame resistance is not new to us. For two years our Mining Cables have been supplied with the same flame resisting qualities as are now required by the State of Pennsylvania."

FROM BAR TO FINISHED WIRE



ROME CABLE CORPORATION

ROME • NEW YORK

COMPLETELY NEW!...

Two-Purpose Tool for Coal and Rock Drilling

Thor

LIGHTWEIGHT, PNEUMATIC

NO. 33 SINKER ROCK DRILL

Three years ago Thor engineers started the development of a new Thor sinker rock drill for the anthracite mines.

A few months ago that finished Thor drill, especially developed for the anthracite field, came up from the mines with so many test-proven "*firsts*" in new operating advantages that it brought with it an urgent demand for immediate production.

Ready now, completely new . . . and *already proven* the ideal two-purpose tool for drilling bottom and top rock as well as coal with auger or hexagon steels, the new Thor No. 33 Sinker Rock Drill is here!

Lightweight—only 39 pounds furnished complete—it is amazingly easy to handle, packs exceptionally powerful rotation to turn auger steels through bony coal or rock . . . worming out cuttings dry without blowing, to reduce dust hazards. Also available for wet operation.

Study all these "*firsts*" in operating advantages you get with the new Thor 33—then call your nearest Thor representative or Thor branch office for further details.

INDEPENDENT PNEUMATIC TOOL COMPANY

600 West Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles Milwaukee New York Philadelphia
Pittsburgh St. Louis Salt Lake City San Francisco Toronto, Canada London, England

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

NEW 5-POSITION THROTTLE

1 Stop
2 Blowing
3 Slow Drilling
4 Medium Drilling
5 Fast Drilling

NEW SHORT-TRAVEL VALVE

Lightweight
Fast Working
Large Bearing
Endless Life
Economical

NEW POWERFUL ROTATION

Exceptionally powerful. Turns auger steel with ease in bony coal or rock.

NEW SIDE EXHAUST

Deflects air from operator and from drilling face. Reduces dust hazard.

NEW FORGED STEEL RETAINER

Encased retainer springs. Easily operated by hand *for life of tool.* Essential *for augering operations.*

NEW LIGHTWEIGHT

Weighs 39 pounds as pictured—with "D" type handle, forged steel retainer and feet for sliding on planks . . . all standard.

NEW HANDLING EASE

Sliding lugs (or feet) retain steel alignment when tool is lying on a plank. Full grip on "D" handle in any position—no scraping of knuckles. Smooth *—minimum vibration.*

NEW GAUGED IMPACT

Fast, positive action with auger or hollow hexagon steel in coal and rock. Striking blow is gauged to prevent excessive auger steel breakage.

Plus THESE MINE-ENGINEERED FEATURES

AUTOMATIC LUBRICATION

Ample reservoir in barrel provides steady, dependable lubrication to all moving parts of drill.

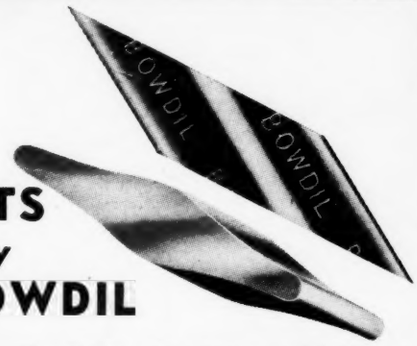
STURDY CONSTRUCTION

Every part a drop-forging of highest quality heat-treated steel, machined to closest tolerances.

LOW-COST REPLACEABLE CHUCK

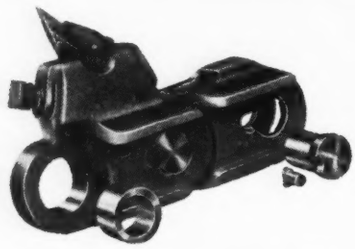
Chuck is easily replaceable and especially low in cost for economical maintenance.

get more $$$ from that MINE of yours!



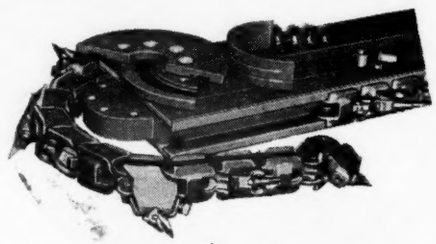
BITS by BOWDIL

Bowdil Bits will cut your coal faster and easier. Heat-treated steel bars are rolled with concave faces, giving the finished bit 25% more wearing length with exceptional savings in power and time. Tests and actual use in hundreds of mines have proved that Bowdil Bits will last 15% to 20% longer.



FABRI-FORGE CHAIN

Lower your operating costs by relying on a Bowdil Fabri-Forged Chain. Bowdil design eliminates troublesome features; produces a chain that is rugged, yet easy to maintain. The drop-forge lug body stands up under heavy wear, for breakage is practically eliminated. The true-running radial track guide is a major improvement.

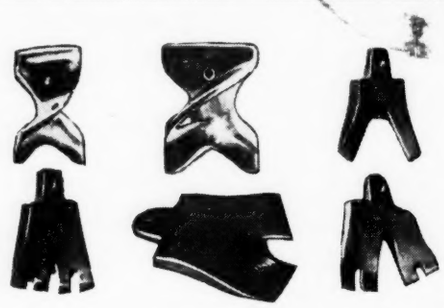


THE BETTER CUTTER BAR

Bowdil Cutter Bars are specially designed to meet present-day demands for extra strength and power saving. Rivet free body, Z bar construction of wide wearing strips result in sturdiest bar used in mining today. Bowdil cutter bars are standardized to fit all coal cutting machines.

ALLOY STEEL AUGERS AND DRILL BITS

There is no "grabbing" tendency with Bowdil augers and drill bits. Uniform temper and shape, achieved by extensive research, eliminate almost all possibility of "grabbing". The use of special heat-treated alloy steels not only makes Bowdil last longer, but adds an important safety factor.



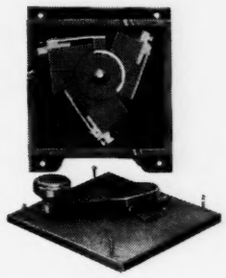
CUT ANYTHING WITH BOWDIL BITS

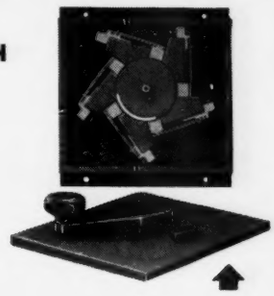
Whatever your bit requirements are, Bowdil can supply them. Fish-tail auger bits, four-point auger bits and two-point clay bits are available in a number of different sizes. They are all made of Bowdil's specially treated steel for long and efficient service.

REPLACEABLE POINT
MINER'S PICK

You can carry an "extra" pick in your pocket! With a Bowdil Miner's Pick, it only takes a few seconds to replace a dull, blunted point with a sharp one. Light or heavy, Bowdil pick heads are perfectly designed for weight and balance.

CHOKE-ARC TRANSFER SWITCH

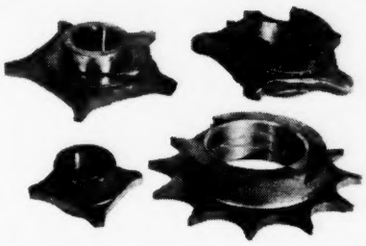




5 FINGER 2 POLE CABLE REEL SWITCH

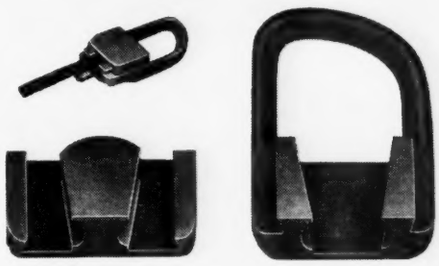
Safety is all-important in mines. A Bowdil Switch enables you to cut power immediately in case of a breakdown in the electrical system. The choke blade, made of extremely high-resistance material, cuts the arc instantly when the switch is thrown under power.

FOR ALL MAKES OF MACHINES



SPROCKETS

Exceptionally long service can be expected from all Bowdil Sprockets, for they are made from special heat-treated alloy steel and designed for hard wear. A stock of over 100 different styles includes clutch type, spline type, keyed type and various tooth designs of from 4 to 13 teeth.



NEW, FAST ROPE SOCKET

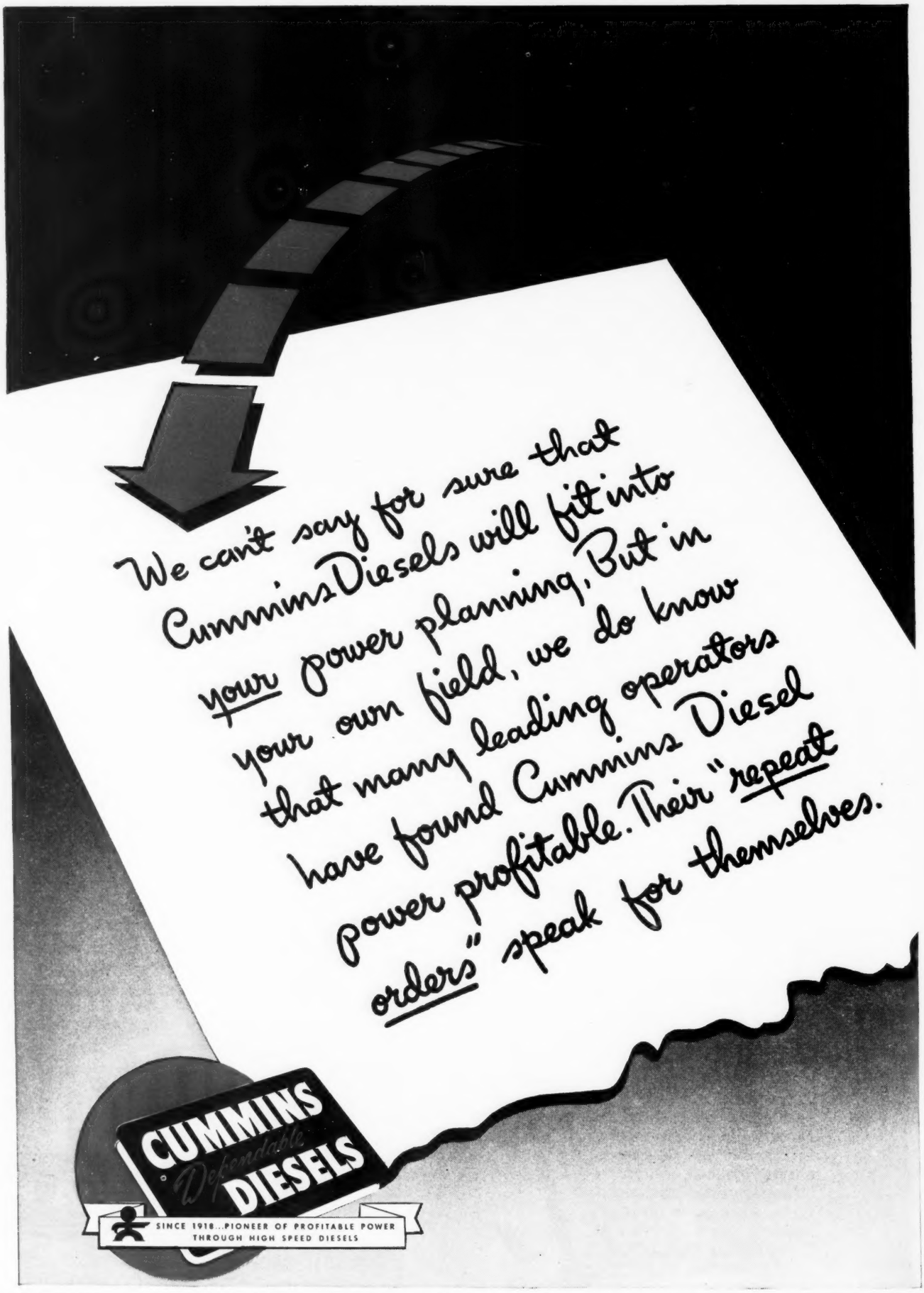
You can save time with a Bowdil Rope Socket, because it takes just two minutes to install one . . and no tools are necessary. The high-tensile steel and improved design give maximum strength.

DETACHABLE JAW SPIKE PULLER

There's no use losing time with inefficient spike pullers. A Bowdil Spike Puller pays for itself many times over. Detachable jaws make it possible to replace claws without delay. The special construction pulls spikes without bending them. Bowdil Spike-Pullers are small, easy to handle.

ALL PRODUCTS OF THE BOWDIL COMPANY

CANTON, OHIO



CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

CUMMINS Dependable DIESELS

SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

PROVED PROFITABLE on the Short, Heavy Hauls

Today, the proved economy and dependability of Cummins Diesels in long-line haulage is a matter of record. On the tough Far West runs, for example, Cummins Diesels power more long-line, franchise-operated, heavy-duty trucks than *all other diesels combined!*

And today, the same proved advantages that made Cummins the undisputed leader in long-haul service are providing new proof of profitable performance . . . *on the short hauls*—over the highway and off. Read the examples below, and then judge for yourself if Cummins Dependable Diesels—150-200-275 hp—are not the "proved producers of low-cost power" for *every* hauling job!

1300 feet

The modern Pond River Collieries in Western Kentucky power both their 22-ton and 32-ton bottom-dump, semi-trailer units with dependable Cummins Diesels . . . move coal fast from pit to washery. Shown here is one of the 32-ton units, powered with a 200 hp Cummins Diesel, which makes a 1300-feet haul in an average time of 2.7 minutes. Three units alone haul 3950 tons in a 7½-hour shift. Proof once again that on long hauls or short, powered with Cummins is powered for profit.

5200 feet

On the vast Mesabi Iron Range, there are 431 heavy-duty trucks hauling up to 30 tons of ore for short distances—up grades as steep as 14%. Of these 431 trucks, 348 (or 8 out of 10!) are powered by Cummins Dependable Diesels. Here a Cummins-powered dump truck is being loaded with 15 tons of overburden at the Hanna Ore Mining Company's Wabigon mine, at Buhl, Minnesota, where hauls averaging 5200 feet are made four to five times an hour.

3½ miles

In the Pennsylvania coal fields, there are approximately 800 Cummins Diesel-powered dump trucks hauling heavy loads over short distances—economically. The Dick Construction Company, one of the oldest and largest striping contractors, bought their first Cummins Dependable Diesel in 1933 . . . now operates approximately 100 Cummins-powered trucks. Driven by a 150 hp Cummins Diesel, the truck shown here hauls 12 to 15 tons of coal or overburden on trips from 1,000 feet to 3½ miles . . . on 1.5 to 2 gallons of fuel per hour.

CUMMINS ENGINE COMPANY, INC., Columbus, Ind.

TOURNAPULLS STRIP
get rush Australian

Quick getaway and high-speed haul mean more yards per hour on ½ to 1 mile cycles

LeTourneau Rooter breaks up shale and slate. Tournapulls load, haul and spread any material a Rooter can dig loose.

Theiss Brothers use Tournapulls' high-speed haul, big load capacity, to break Allied coal bottleneck.

PROBLEM — In 1944, coal situation for Allied us in Australia was desperate. New sources of supply ha to be developed quickly. Commonwealth Coal Commis sion decided to establish new open-pit mines to increas local production, let contract for stripping operations a Mussellbrook, near Newcastle, N.S.W. to Theiss Brother Brisbane. Overburden ran from 15 to 25' deep . . . varie from earth and clay to shale and slate.

SOLUTION — Theiss moved 4 Tournapulls onto jo quickly stripped off earth and clay, wasted it at distance varying from ¼ to ½ mile, eliminating problem of m handling. The rigs' 15-heaped-yard capacity, high-spee haul and big rubber-tired traction kept production hig despite unfavorable haul grades.

Tournapulls' fast, accurate spread leaves level dump ... additional spreading equipment is needed.

TOUGH 25′ OVERBURDEN
coal moving in 3 weeks

open, coal coming out. Tournapulls keep stripping to open up additional coal.

hale and then slate were broken up by LeTourneau ooter. In this difficult material, Tournapulls got heaped oads, kept up their highball schedule.

ESULTS: — 3 weeks after start of job, coal was ading into railway cars. Initial quota of 10,000 tons coal a day was quickly bettered. Production soon ached maximum railway capacity as Tournapulls ened more pit area. So fast, convenient and economi- was Tournapull stripping that further Australian en-cut projects by similar method are being planned.

any type of mining where haul or rehandling involved, Tournapulls are the lowest-net-cost- r-yard answer to your problem of overburden moval. Your nearest LeTourneau Distributor n give you proof of low-cost, big-yardage urnapull performance on both long and short uls... in all types of materials... under tough pit nditions. Ask him for facts and figures today!

Tournapulls' big, low-pressure tires are easy on haul roads. Rigs can build, surface and maintain their own roads.

t of stripping operations. 3 weeks later, was being loaded into railroad cars.

TOURNEAU PEORIA, ILLINOIS · STOCKTON, CALIFORNIA

JOB-PROVED Over 4300 Built and Shipped

TOURNAPULLS

A MARION WILL GET TO THE BOTTOM OF THAT COAL-STRIPPING PROBLEM!

MARION shovels and draglines have "grown-up" with the coal-stripping industry. Working hand-in-hand with coal-stripping operators, MARION has pioneered or sponsored every major development in shovel and dragline equipment for the efficient and economical handling of the millions of yards of tough digging involved. MARION owners in the coal field will confirm this. Today, there is a MARION of the right size and type to solve every coal-stripping or coal loading problem. Tell us yours.

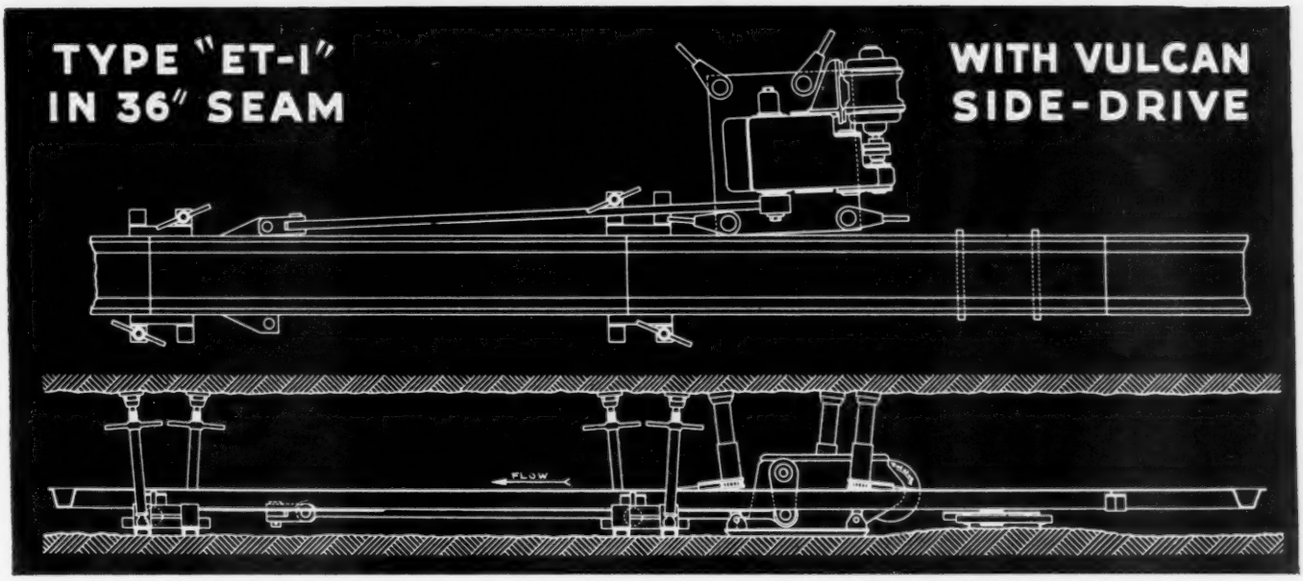
MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities

Note: Marion Power Shovel Company — Formerly The [illegible] Shovel Company — Established 1884.



SHAKING-CHUTE CONVEYORS

For Low-Height Coal

More than a quarter-century of successful experience in the design and manufacture of shaking-chute conveyors has taught Vulcan engineers where trouble is most apt to develop and how to guard against it. The ET-1 Drive Unit here illustrated "HAS EVERYTHING", therefore, to assure efficient service at minimum expense for maintenance and repairs.

Equipped with oversize heat-treated alloy-steel gears and shafts mounted on anti-friction bearings in an oil-tight cast-steel housing, it drives several hundred feet of heavily-loaded chute for long periods of time without need for any other attention than occasional lubrication. With the Vulcan side-drive connection shown in the diagrammatic illustration above it can be installed in seams as low as 22" without taking up rock and without need for an extended bed plate, outboard bearing or any of the other accessories required for some other types of side-drive connections.

Write us regarding any underground coal or rock handling requirement. We not only manufacture a widely-used and highly developed line of Shaking-Chute Conveyors but also an equally complete and service-proved line of Chain Conveyors, so that our experienced engineers can afford to be absolutely impartial in their recommendations. Bulletins containing complete working data mailed promptly on request.

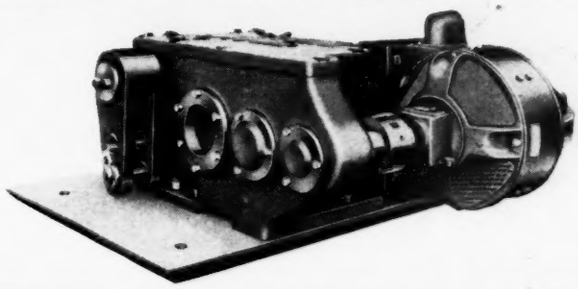


Illustration above shows Vulcan Shaking-Conveyor Drive Unit, Type ET-1, driven through flexible coupling by 15 hp. electric motor. When desired, a compressed-air motor of comparable power can be mounted on the same bed-plate without increasing the overall height of 20¼". Construction throughout is simple and rugged with minimum number of working parts. Powerful cast-steel housing and cover-plate have demonstrated ability to withstand heavy rock falls without damage to enclosed parts.

VULCAN IRON WORKS, Wilkes-Barre, Pa., U.S.A.

Branch Offices:
50 Church St., New York, N. Y.
Southern Bldg., Washington, D.C.

Long Super Mine Car Co., Inc.
Fayetteville, West Virginia

Keiser-Geismer Engineering Co.
1309 First National Bank Bldg.
Birmingham 3, Alabama

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

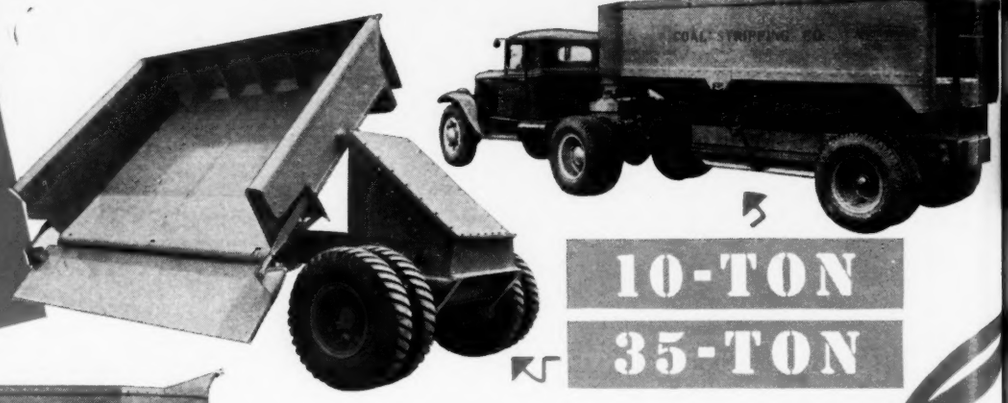
Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

Western

SIZES AND TYPES FOR ALL REQUIREMENTS



10-TON

35-TON

16-TON

50-TON

Rocker beam, tandem axles with transverse and vertical oscillation.

20-TON

30-TON

25-TON

TRAIL CARS

DOMINATE THE STRIP MINES

INTRODUCED eleven years ago, with a background of over 50 years of dump car manufacturing; first to use air-operated and hydraulically-operated clamshell type doors; made in two types and in capacities of from 6 to 65 yards, carrying loads of from 10 to 60 tons; there are more "Western" Trail-Cars in use in coal strip mines today than all other tractor-truck trailer units combined.

Hopper-type Trail-Cars have quick-acting, bottom discharge, automatic air-operated, high-clearance clamshell doors controlled by the truck driver. The doors swing sideways, upward and outward, providing maximum clearance. The only semi-trailer with air-operated doors. Can be dumped anywhere. Alloy steel construction provides greater pay loads with less dead weight. New railroad-type coil spring suspension reduces sideway and spillage to minimum; fewer spring replacements.

Side-dump Trail-Cars are of the one-way or two-way side-pivot, tray-type or drop-door type with automatic hydraulic dumping mechanism operated by the truck driver.

Our engineering and manufacturing facilities are always available for the production of special equipment to meet unusual requirements.

World's Largest Manufacturer of Dump and Trail-Cars

AUSTIN-WESTERN COMPANY

(Formerly the Western Wheeled Scraper Company)

AURORA, ILLINOIS • CABLE ADDRESS: AWCO, AURORA

Austin-Western also builds Power Graders, Rollers, Shovels and Cranes, Street Sweepers and a complete line of Rock Crushing and Screening Plants and kindred equipment.

RECORD

Main slope conveyor carries run-of-mine coal from underground hopper to top of preparation plant. Capacity 1,000 TPH. Belt is U.S. Matchless grade, 54 in. wide, 7-ply, 42-oz. duck; covers: top, 1/4 in., bottom, 1/16 in.

BREAKER

BUILT BY COORDINATED ENGINEERING

Here is another example of engineering teamwork in planning and building an efficient conveyor belt system.

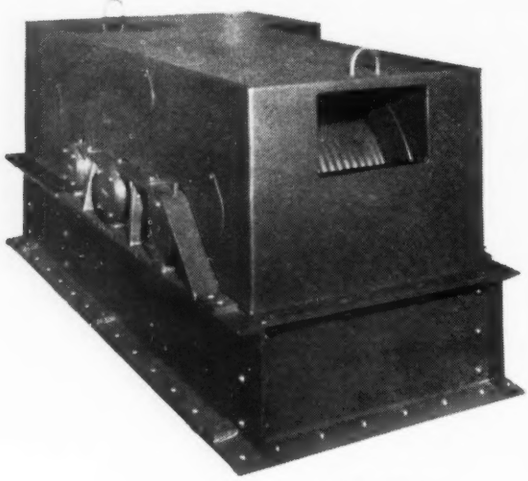
Shown here is one of the two strip mines which established records for coal output for 1944 in their area—a record which has been continuously maintained.

In both cases United States Rubber Company technicians, teamworking with the engineers at the mine and the designers of mechanical equipment, produced the belts capable of handling this enormous volume on a profitable basis.

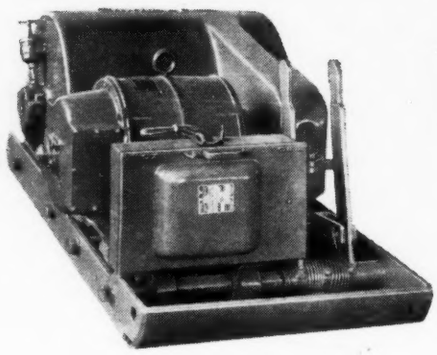
UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y. • *In Canada:* Dominion Rubber Company, Ltd.

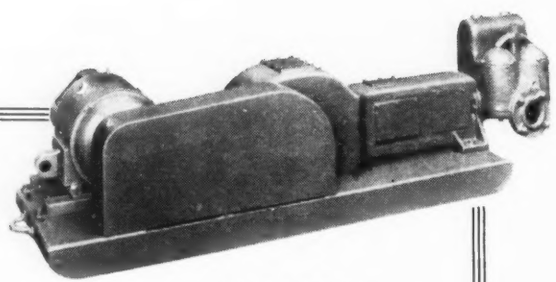
The right HOISTS for



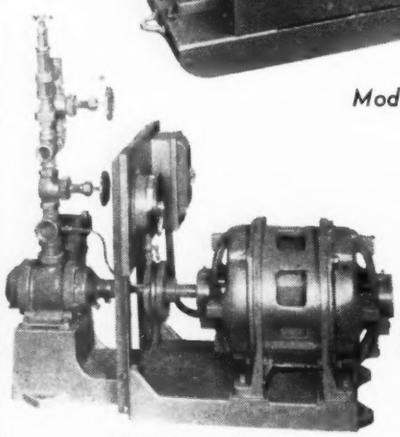
HKI Hoist



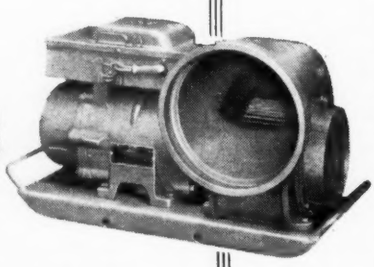
HGD Hoist



Model PF Pump



Oil Spray Outfit



BC Blower

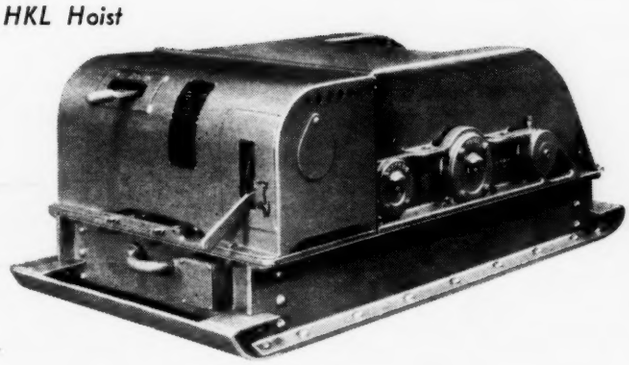
Model HGD Hoist is rated 2,000 lbs. at 70 feet per minute—particularly useful in moving equipment when changing conveyor set-ups. Model HKI, a Layer Loading Hoist, is supplied to shuttle railroad cars back and forth past the tipple loading point to obtain uniform chemical and physical analysis throughout the cars. It is rated 24,000 lbs. rope pull at 60 feet per minute with a 40 hp motor.

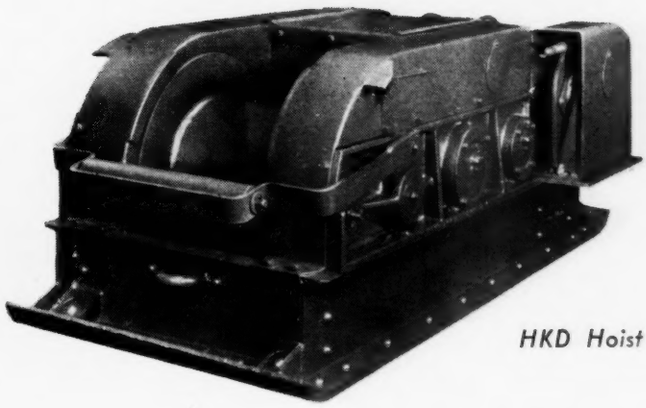
Brown-Fayro Model BC Blower, for auxiliary ventilation of mechanized working places, has a nominal rating of 1,700 cubic feet of air per minute through 300 feet of 12" tubing. It can be furnished with standard or permissible electrical equipment.

Our Mine Gathering Pump, size 6x6, is rated 100 g.p.m. at 200' head using a 10 HP motor. This unit is also made in 4x5, 5x5 and 5x6 sizes, using motors of 3 to 7½ HP.

For dust-proofing Brown-Fayro supplies an Oil Spray Unit which obtains atomization with high pressure and impact-type nozzles, without heating the oil except under special circumstances.

HKL Hoist

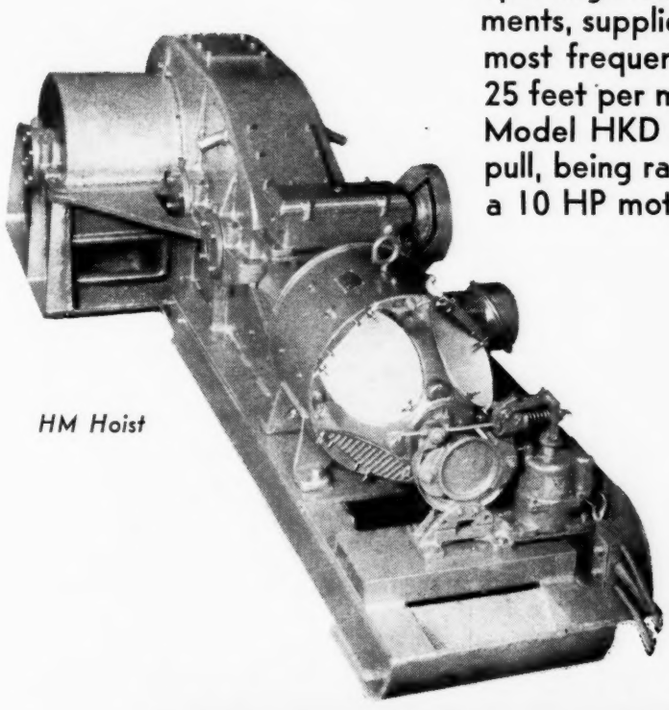




HKD Hoist

YOUR *mine!*

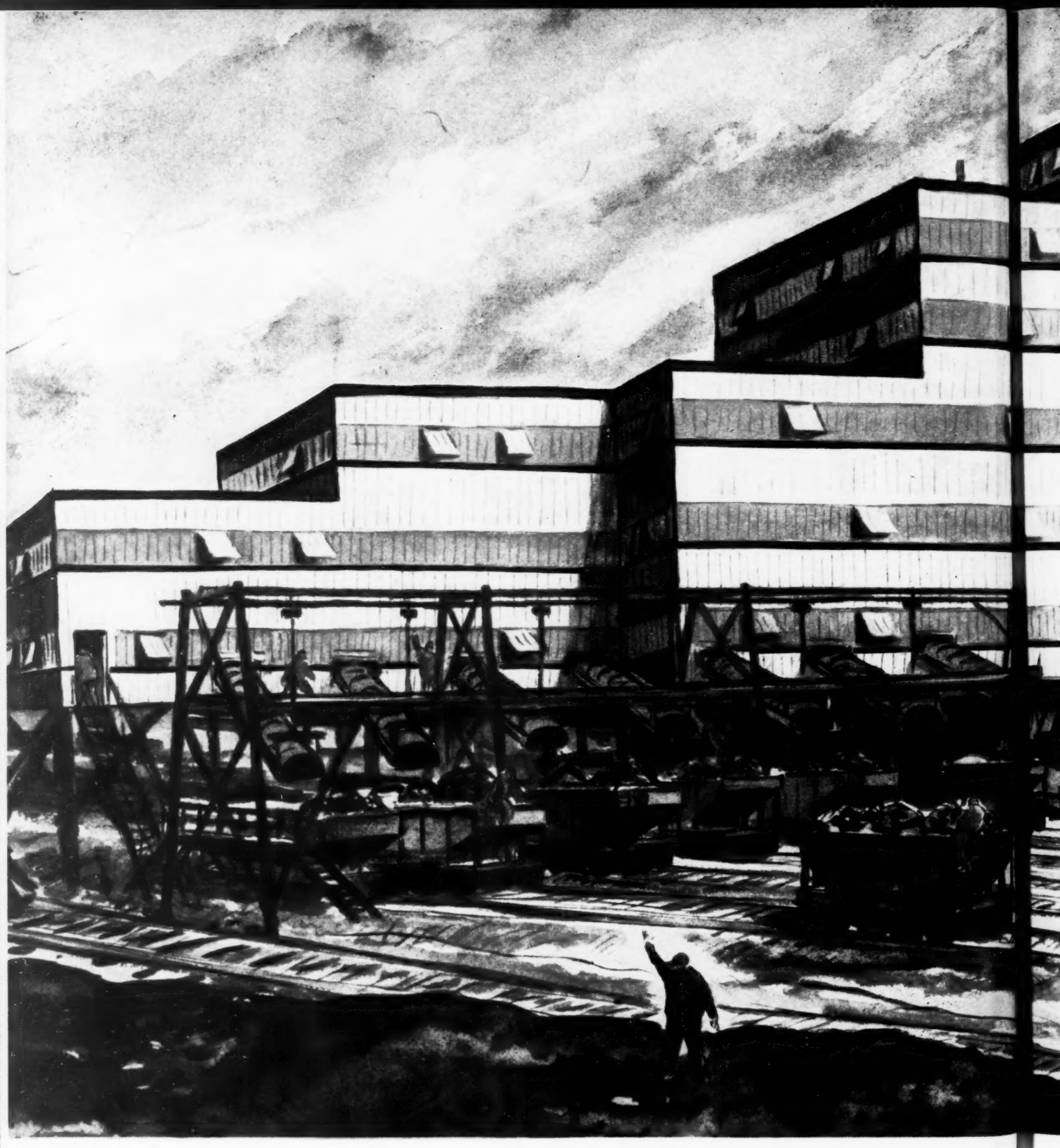
Brown-Fayro *knows* what type of equipment you want and why you want it—knows which type will work to best advantage in your mine operations, and can supply accordingly! For example, the HKL, HKD and HM Car Spotting Hoists shown are designed for specific requirements, supplied to meet individual needs. Model HKL, most frequently used, is rated 6,000 lbs. rope pull at 25 feet per minute, with a 5 HP motor, using 5/8" rope. Model HKD is for applications requiring greater rope pull, being rated 12,000 lbs. at 35 feet per minute, with a 10 HP motor, using 3/4" rope. Model HM, built for high loading rates, is invaluable wherever it is necessary to avoid shutting down the conveyor when changing trips. With this model, cars are moved by a barney operating in guides placed between the mine rails. It is rated 12,000 lbs. rope pull and is driven by a 15 HP motor.



HM Hoist

Brown-Fayro will send illustrated material, describing these products and their application more fully, on request.

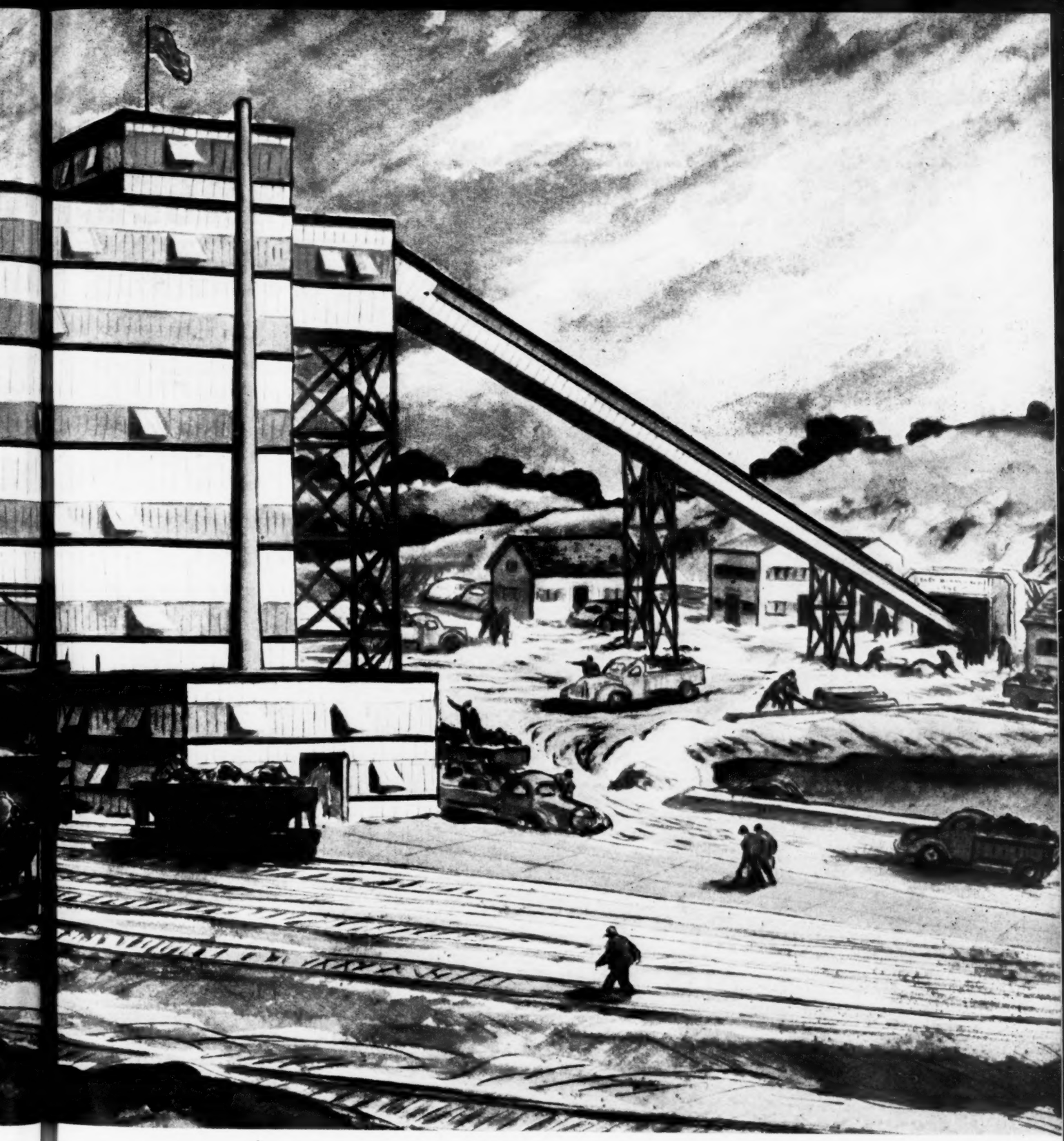
THE BROWN-FAYRO COMPANY
JOHNSTOWN, PENNA



COAL PREPARATION EFFICIENCY

This newest and most modern Roberts and Schaefer Coal preparation plant — at the New East Diamond Mine of West Kentucky Coal Company — capitalizes on experience.

The new plant is built around R&S Hydro-Separators on 6" x ¼" coal and R&S Hydrotators on ¼" x 0" coal — the equipment which helped win a Coal for Victory Award at the North Diamond Mine of the same company. The recognized efficiency of sound engineering and proper selection of equipment are combined at East Diamond in a plant of which both owner and contractor may be proud.



Speaks for itself

ROBERTS and SCHAEFER CO.

305 North Michigan Avenue, Chicago

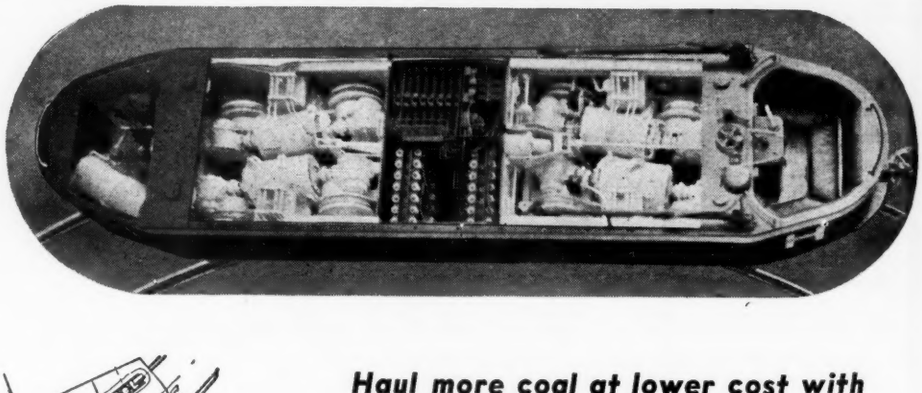
2221 Oliver Building
PITTSBURGH, 22, PA.

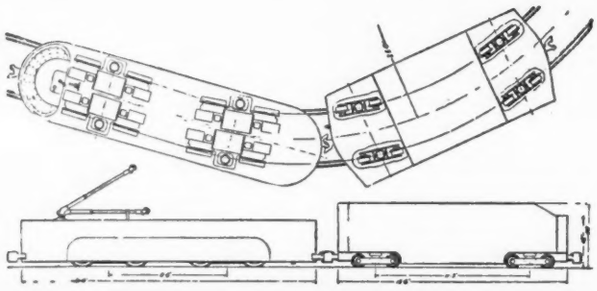
P. O. Box 570
HUNTINGTON, W. VA.

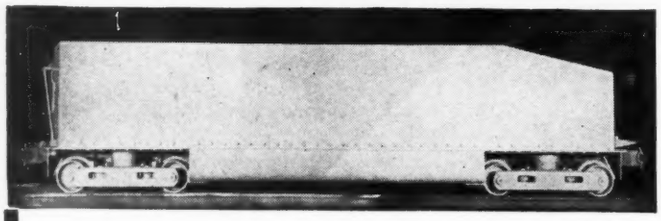
Increase Efficiency • • • • • reduce
DIFFERENTIAL 8-WHEEL AXLESS

Plan View

shows 21-ton Differential AXLESS locomotive on a 25-foot radius curve — notice compact design and accessibility for easy maintenance.







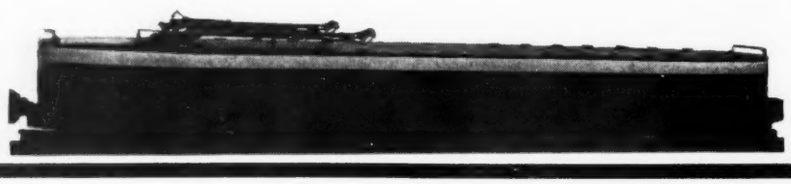
★ DIFFERENTIAL *Large Mine Cars* with 8-Wheel AXLESS Trucks

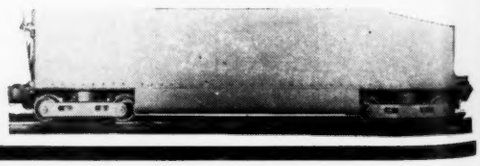
The Differential large mine car will increase the capacity of your loading machine and consequently decrease the cost per ton. While the large mine car offers many cost reducing possibilities, its ability to increase the tonnage per machine shift is an important advantage. These large Differential mine cars with patented 8 wheel AXLESS trucks provide greater carrying capacity within a limited height—require fewer cars and less maintenance. Smooth riding reduces spillage on haulage ways and assures safety at higher speeds—resulting in less cost per ton—more tons per shift.

Haul more coal at lower cost with

★ DIFFERENTIAL *8-Wheel AXLESS Locomotives*

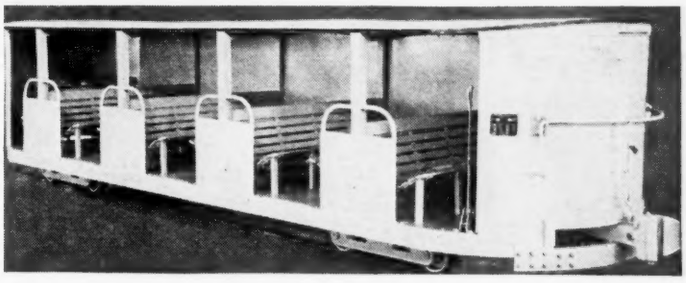
Differential 360 HP 8-wheel AXLESS locomotives provide greater power for hauling larger trains—faster—at lower cost. These streamline heavy duty locomotives have more adhesion available for tractive effort and braking. There is no connection between the wheels on one rail and those on the other, therefore, in negotiating a curve there is no slippage caused by difference in wheel travel. By eliminating this slippage, adhesion between rail and wheel is unbroken and there is no drawbar pull loss. This modern AXLESS truck locomotive provides greater traction—power on all eight wheels—smooth riding—and enables it to haul heavy loads at high speeds in safety. Full anti-friction bearings and gears operate in a bath of oil sealed away from dirt.





your costs with LOCOMOTIVES

★ DIFFERENTIAL *Man-Trip Cars*



This sturdy Man-trip car with Differential 8-wheel AXLESS Trucks meets the need for safe, rapid transportation of men to and from working places underground.

It provides a comfortable, clean, dry ride for the men and gets them to working face quicker—with safety—in comfort.

The car is 22 feet long—seats 38 men—and can negotiate a 30 foot radius curve. Steel construction is used throughout with insulating cover over the metal roof as a protection in event trolley wire is encountered. Both ends and trolley wire side are fully enclosed to prevent men from getting out on the wire side and avoids costly accidents. This construction protects men from roof falls, rock dust and water and shields them from cold intake air in winter.

★ DIFFERENTIAL *Larries*

Differential Larries have proved ideal for mine refuse disposal—require no trestles or cribs in building dump — negotiate steeper grades safely—have better traction —equalized wheel loading—low operating costs—one man operation—dump three ways. Sizes available for all size operations.

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS · MINE CARS · MINE LOCOMOTIVES · ROCK LARRIES · DUMPING DEVICES
BURDEN-BEARING LOCOMOTIVES · STOCKPILING CARS · COMPLETE HAULAGE SYSTEMS

BLUEPRINT

Scope of A & G *Services*

★ **Design and construction of new plants and their various units**

★ **Organization, operation, and management of mines**

★ **Below ground modernization and mechanization**

★ **Reconstruction, revamping, or improvement of existing plants**

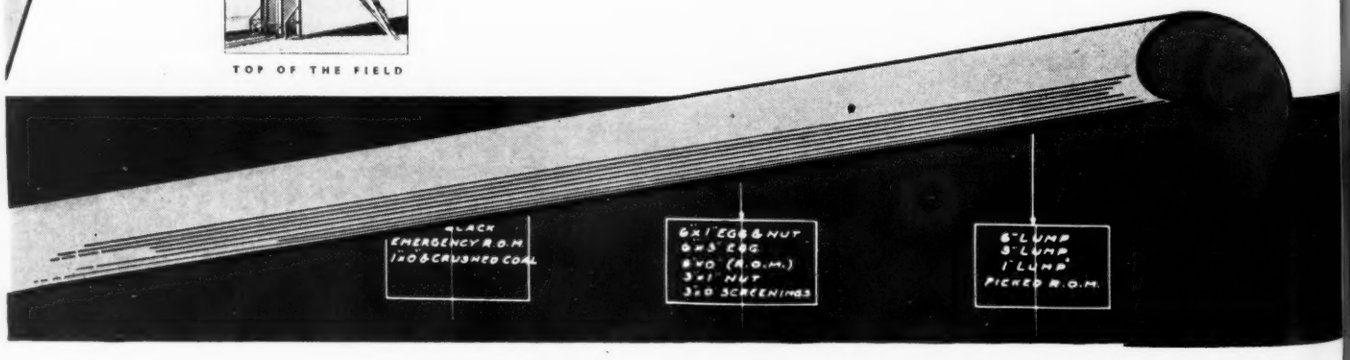
★ **General consulting work regarding power, equipment, operation, and various mining problems**

★ **Valuations for financing, fire-loss, taxation purposes — reports and appraisals**

For 35 years Allen & Garcia Company has been operating on a fixed percentage fee basis for clients in the coal mining industry, above and below ground. Mines have been planned, preparation plants designed and built for nearly every seam of coal being mined in the United States today.

A& CO. G

TOP OF THE FIELD



YOUR PLAN FOR *Progress*

Your Plan Must

- *develop lower costs*
- *provide a more salable product*
- *make manpower more productive*
- *provide more for the worker*
- *maintain a satisfactory return on investment*

THE blueprint is symbolic of the engineer. He anticipates all the angles *before* the mistakes are made. He "gets them on the rise" — he forestalls tomorrow's headaches — he has the KNOW HOW *before* he starts and wants no part of a "by guess and by jeepers" method.

To be sure, all the variables in planning the production and preparation of coal cannot be put in a blueprint. But all factors must be analyzed, given their correct evaluation and fitted properly into the pattern or discarded. Such planning calls for *independent professional engineering service* in order to get the benefits of broad experience beyond the scope of the project under consideration.

The adaptation of machinery in itself is not enough to assure efficient operation. The correct application of machines — the elimination of "bottlenecks" — the reduction of down-time — the proper rate of amortization — the proper ratio of investment to future production-per-man — these subjects, and many others call for the unbiased, experienced thinking of specialized engineers.

A & G engineers work for the client alone. We design to eliminate excess equipment, to simplify operations, to lower maintenance requirements in terms of man-hours and, being independent, we are not hampered by any connections which might prejudice the true professional engineering approach to the problem.

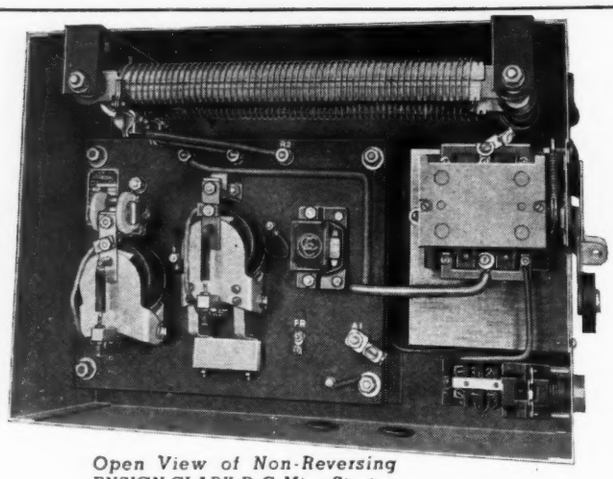
May we have the opportunity of analyzing your problem and presenting a preliminary plan for action?

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK, N. Y.

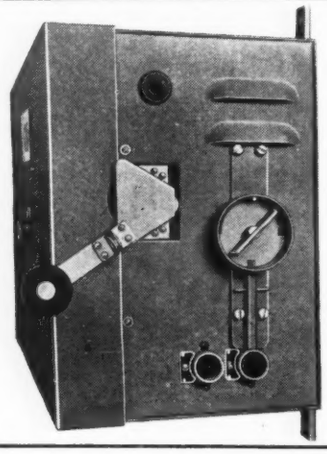
ENSIGN-CLARK



Open View of Non-Reversing ENSIGN-CLARK D.C. Mine Starter.

. . . the only mine starter made with counter-balanced contactors . . . operates in most every position!

D. C. MAGNETIC



End View of Cabinet showing method of interlocking manual reversing switch with stop button.

Features of the ENSIGN-CLARK Starters that will interest you include:

- **Clark Bulletin 7400 Vari-Time Contactor to provide definite time acceleration.**
- **Counter-balanced accelerating contactors to permit starter operation in practically any position.**
- **Non-breakable Edgewound Resistors.**
- **Mechanically and electrically inter-locked reversing switch to prevent plugging.**

Other equipment includes fuse cut-out, 2 or 3 wire control, skid-mounting, and Magnetic overload or Thermal Overload relay. ENSIGN-CLARK D. C. MAGNETIC MINE STARTERS are available in Magnetic Reversing types, also manual non-reversing types for use on pumps.

MINE STARTERS

ENSIGN

ELECTRIC AND MANUFACTURING CO.

HUNTINGTON 8 WEST VIRGINIA

THE CLARK CONTROLLER CO.

1146 EAST 152nd ST., CLEVELAND 10, OHIO • EVERYTHING UNDER CONTROL

Write for Bulletin 5390. Contains complete operating and construction data on ENSIGN-CLARK Magnetic Mine Starters.

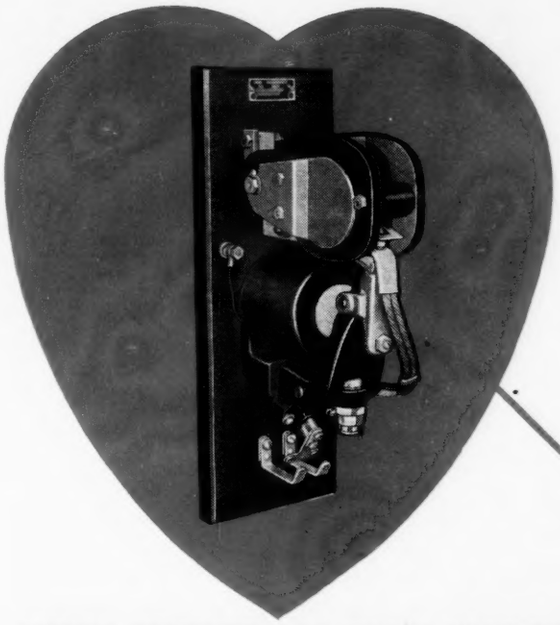
ENSIGN-CLARK D. C. MAGNETIC MINE STARTERS

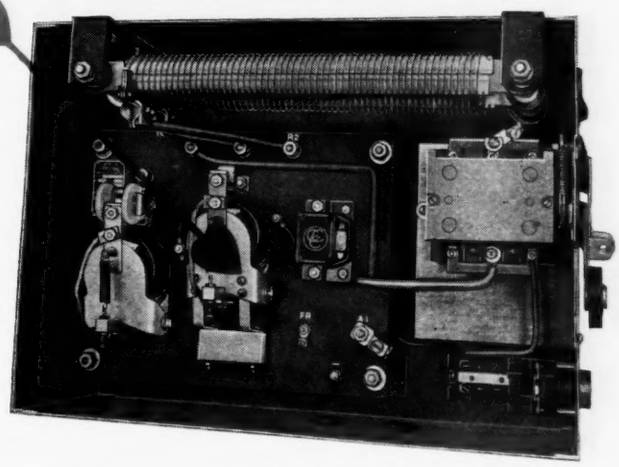
THE HEART of

ENSIGN-CLARK D. C. MINE STARTERS

is the "3C" BULLETIN 7400 *Self-Contained* VARI-TIME CONTACTOR

—providing definite time acceleration without timing relays. Counter-balanced accelerating contactors permit starter operation in practically every position.





Open View of Non-Reversing ENSIGN-CLARK D. C. Mine Starter.

OTHER FEATURES OF THESE STARTERS:

1. Non-breakable edgewound resistors.
2. Mechanically and electrically interlocked reversing switch to prevent plugging.
3. Fuse cut-out, 2 or 3 wire control, skid mounting, magnetic or thermal overload relay.
4. Available in 8 basic types, 230V or 500V. Non-reversing, Manual-reversing, Magnetic-reversing; Pump starter (Manual non-reversing).

TYPE DESIGNATIONS

Starter	H. P. Range	230 Volt	500 Volt
Non-reversing	10 to 30 incl.	Type 2NR	Type 5NR
Manual reversing	10 to 30 incl.	Type 2R	Type 5R
Magn. reversing	10 to 20 incl.	Type 2RM	Type 5RM
Pump starter (Manual, Non-reversing)	3 to 7½ incl.	Type 2P	Type 5P

Ask for fully descriptive "3C" Bulletin 5390.

ENSIGN ELECTRIC AND MANUFACTURING CO.

THE CLARK CONTROLLER CO.

1146 EAST 152nd ST., CLEVELAND 10, OHIO • EVERYTHING UNDER CONTROL

LIKE A CHAMPION VAULTER...

FORM-SET ROPE IS *relaxed*

You marvel as his body clears the bar, then falls through space in a graceful arc. Thirteen, fourteen, fifteen feet he drops, yet he lands unhurt . . . because he's *relaxed*.

When handling Form-Set, Bethlehem's preformed rope, you'll notice much of that same relaxed effect. The reason is, of course, that the preforming process shapes each wire and strand to a permanent helix—a shape they retain through the life of the rope. Even though the rope be cut or broken, the wires and strands "stay put." They don't bush out or pop from the core.

This is because the tension is gone—relieved by preforming. The rope is *relaxed*.

What does this bring you? Easier handling, for one thing. More important still, a preformed line is much less subject to bending fatigue. On applications where bending stresses are high, a Form-Set rope has longer life. This means greater economy . . . fewer replacements . . . fewer reriggings.

No matter what rope you want—no matter what grade, type, or size—you can get it with the Form-Set feature. Details are available through the nearest Bethlehem representative.

This is Form-Set rope. The strands have been lifted out by hand. Note how the wires lie smoothly in place. There is no inner tension to force them apart.

When you think WIRE ROPE . . . think BETHLEHEM

SINCERE congratulations to the Coal Industry on the outstanding production record made during the war, and to Coal Age for their "Coal for Victory" award in recognition of this achievement.

Many of the coal mines of the United States, whose splendid tonnage production earned the "Coal for Victory" Award, are users of AMERICAN explosives and AMERICAN electric blasting caps... products that have proved their merits through years of service.

• *Capable field engineers are available at your call.*

★ **HIGH EXPLOSIVES**

★ **PERMISSIBLES**

★ **BLASTING POWDER**

★ **BLASTING ACCESSORIES**

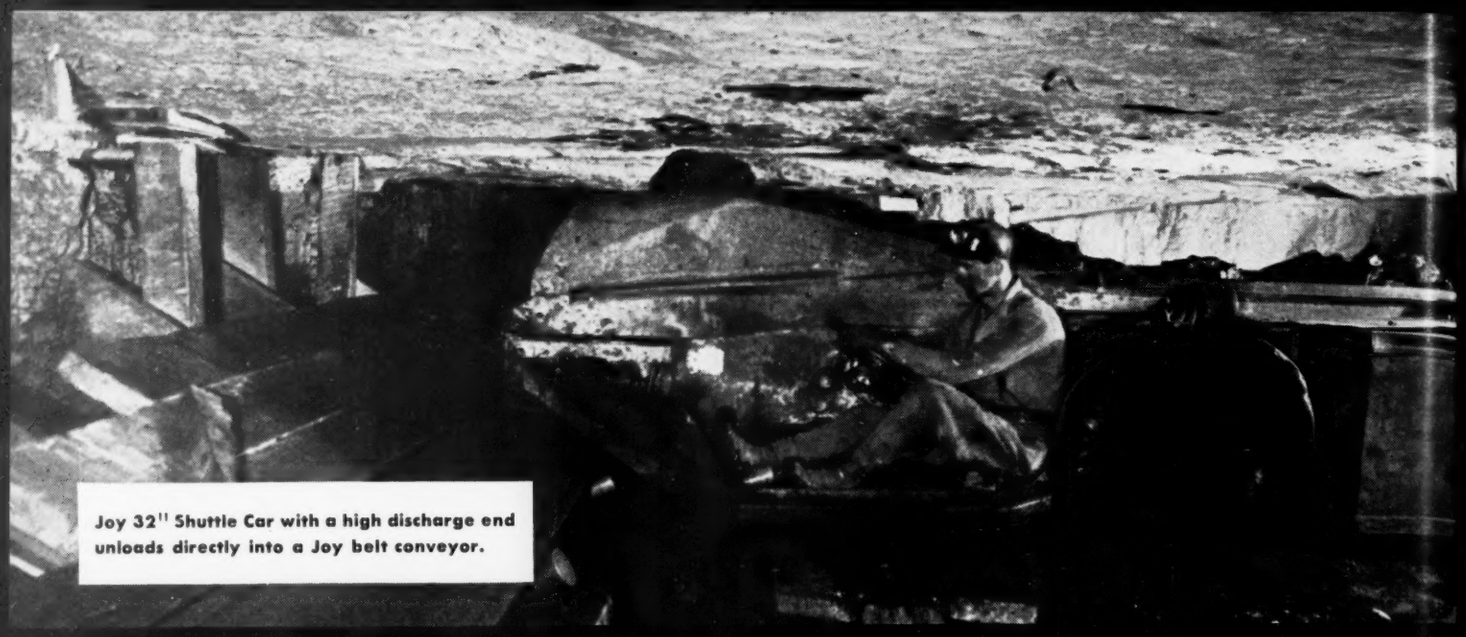
American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

EXPLOSIVES DEPARTMENT

SALES OFFICES: Pittsburgh, Pa. Bluefield, West Va. Scranton, Pa. St. Louis, Mo. Chicago, Ill. Pottsville, Pa. Hazleton, Pa. Maynard, Mass.



Joy 32[11] Shuttle Car with a high discharge end unloads directly into a Joy belt conveyor.

CHECK THESE FEATURES-

- ✔ **Greater production per man-hour**
- ✔ **Fast, economical tonnage movement**
- ✔ **Rugged construction, easy to handle**
- ✔ **Assured low maintenance expense**

On-the-job lubrication is an easy matter with Joy equipment. Here a 14 Bu. gets maintenance attention.

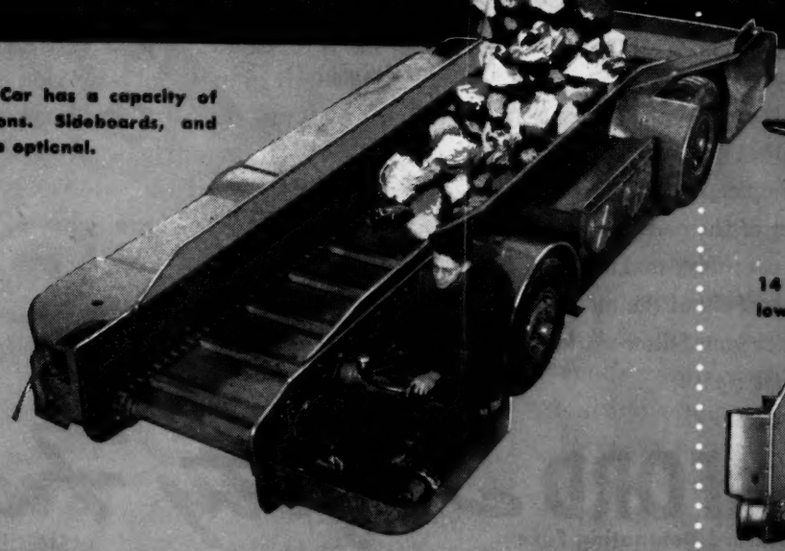
27 Joy Equipped Mines Shared Coal-for-Victory Awards

Joy is proud to have had a part in helping to set the record-breaking tonnages marked up by the 27 mines out of 50 that were given production and efficiency citations in the Coal Age Coal-for-Victory Awards in 1945.

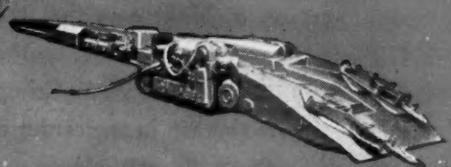
In mines with seams 5 ft. or larger, the Joy 11 Bu can load up to ten tons per minute.

JOY

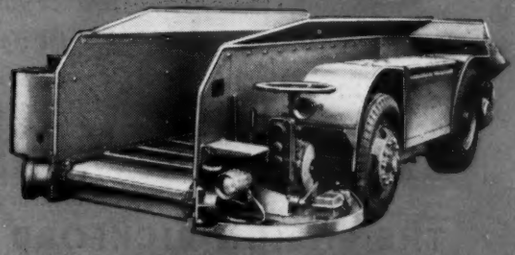
MINING EQUIPMENT



The 32" Joy Shuttle Car has a capacity of approximately 3½ tons. Sideboards, and elevated discharge are optional.



14 Bu. Loader is a fast, economical loader for low seam operations. Overall height is 38½".



42" Shuttle Car for high seams. Battery or cable reel, elevated discharge and sideboards are optional on order.

Call for a Joy Engineer

JOY MANUFACTURING CO. **FRANKLIN, PA.**

SIMPLE STEPS TO SAFETY

Wherever blasting is done — wherever Safety Fuse is used — the *right* way to use it is really the simplest way — *and certainly the safest.* Never try to short-cut the time-proved methods that give safest and best results.

These are the safety rules: 1. Cut a length of Ensign-Bickford Safety Fuse long enough to extend well out of the mouth of the bore hole when the cartridge is in place. 2. See that the end to be inserted in the cap is freshly cut, clean and square across. 3. Make sure that there is no foreign material inside the cap. 4. Place the cap onto the fuse so that the freshly-cut end of the fuse is snug against the explosive charge. 5. Crimp cap onto the fuse tightly with a crimping tool. 6. Insert the cap in the center of the cartridge. 7. Tie fuse and cartridge together firmly. 8. Load the hole carefully, making sure the fuse is straight, without kinks, and that it extends *well out* of the mouth of the bore hole.

For your own protection — and for your fellow workers' — keep Safety Fuse *safe* by using it the simple way — *the right way.*

S-26

ENSIGN-BICKFORD *Safety Fuse*

Also Primacord-Bickford Detonating Fuse

SINCE 1836

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONNECTICUT

"First in Fusing a Safer America"

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Ivan A. Given, EDITOR

MAY, 1946

Foundation For Mining Progress

A LOW price to the consumer, provided it is rooted in high efficiency, is the best economic policy an industry can have. With high efficiency, prices can be kept low while good wages are paid and reasonable dividends returned on investments to serve the public and create jobs. This keeps consumers happy and forestalls competition. Management and men employing modern methods and using modern equipment at its maximum capacity add up to maximum coal-mining efficiency.

Coal mining, incidentally, was one of the few major industries in the United States—and, very likely, the only coal industry in the world—to raise individual productivity in the war years. True, some of this increase was the result of more working time. The greater part, however, reflects large outlays for new equipment and intensive study of ways and means of raising efficiency both before and during the war. Those outlays of money and thought enabled coal mining in the United States to meet its wartime obligations in full, in sharp contrast to the record in other countries.

War and prewar stress on productivity also augurs well for the future. The pace set by the "Coal-for-Victory" mines in 1944 and 1945, when times were—to say the least—somewhat difficult, supports the conclusion that wide gains in efficiency are there for the making, while increases in wage and other costs underscore the necessity. Gains in average productivity ranging from 0.45 to 0.85 tons per year in 1944 and 1945 at identical hand-loading and mechanized mines with varying seam thicknesses are evidence of the opportunities in the years just ahead. If cashed in on, coal can look forward to a major decrease in competitive pressure.

"Coal-for-Victory" mines made a vital and significant contribution to the nation's war effort —a contribution differing only in degree from that of the many others that also increased both tonnage and efficiency. Not only does that contribution reflect great credit on both management and men—it establishes a solid foundation for accelerated progress in the art of mining in the future.

The result of increased efficiency is greater mining prosperity. "Coal-for-Victory" mines have convincingly demonstrated how application of fundamental principles in the installation of cost-cutting equipment and its more efficient use can increase productivity, raise quality and promote safety. The mining "know-how" they have developed is the subject of the feature material in this "Mining Efficiency Number" of *Coal Age*—a tribute to outstanding achievement and a guidepost to progress in more efficient coal production.

MANAGEMENT:
Vital Ingredient in Efficiency

MANAGEMENT and men using modern equipment at its maximum capacity add up to maximum efficiency in coal mining. When that statement is analyzed it becomes apparent that efficiency involves four things:

1. Management.
2. Men.
3. Modern high-capacity equipment.
4. Utilization of that equipment at the maximum possible capacity.

Management deservedly ranks first in this listing because how well it understands its job and does it determines in large measure how far men and equipment can go in achieving the efficiency so necessary to keep down costs, pay good wages, yield a reasonable return to investors and beat back competition, thus making it possible for the industry to cash in more surely on the real opportunities ahead.

Management's job involves not only the selection and installation of modern, high-capacity equipment but its operation for maximum productivity per man. It involves also safe operation, meeting consumer demands with a uniform, high-quality product and promotion of cooperation between company and employees. It involves, further, training for both management and men, proper use of incentives and the doing of anything and everything else that will raise efficiency, promote safety and improve quality.

The fact that coal-mine management already has made good progress toward its ultimate goal was strikingly brought out by the industry's contribution to the war effort. It has been said before that coal was one of the few basic industries, if not the only one, to produce more and more with less and less—more and more coal with fewer and fewer men. The industry's war record stands as a real tribute to the millions of dollars and barrels of brain sweat poured out over the years on efficiency, safety and quality—and the real help rendered by the manufacturers and suppliers of equipment and materials for better, safer mining.

The "Coal-for-Victory" award winners naturally take their places as the leaders in supporting the war effort through increased efficiency and higher tonnage, although this detracts no whit from the accomplishments of the many other properties that missed—sometimes by very narrow margins—qualifying under the rules governing the 1944 and 1945 competitions, conducted with the support and cooperation of the Solid Fuels Administration for War. Their contributions also augur well for the future

progress of the coal industry. In addition to others detailed in other sections these contributions include:

1. Demonstration of the value of machinery in the promotion of quality and efficiency.

2. Demonstration of the value of training and incentives in enabling both management and men to function more effectively.

3. Demonstration of the value of promoting understanding and cooperation between management and men in fostering industry progress.

MACHINES BOOST PRODUCTIVITY

Since mechanical loading equipment has been accepted as the major means of attaining higher productivity in underground coal mining, it is no surprise that the study of the operations of the "Coal-for-Victory" award winners comprising this issue shows:

1. Partial or complete mechanization of a number of operations since 1943.

2. Significant changes in types of equipment to achieve higher productivity at a number of properties.

3. Significant changes, also, in mining plans for the same purpose.

4. Growing appreciation of the importance to face procedures of auxiliary equipment and operations.

In stripping, the study showed a parallel trend toward better use of higher-capacity units to meet problems of increasing overburden thickness and longer distances and to render the better service to producing units necessary to get maximum efficiency.

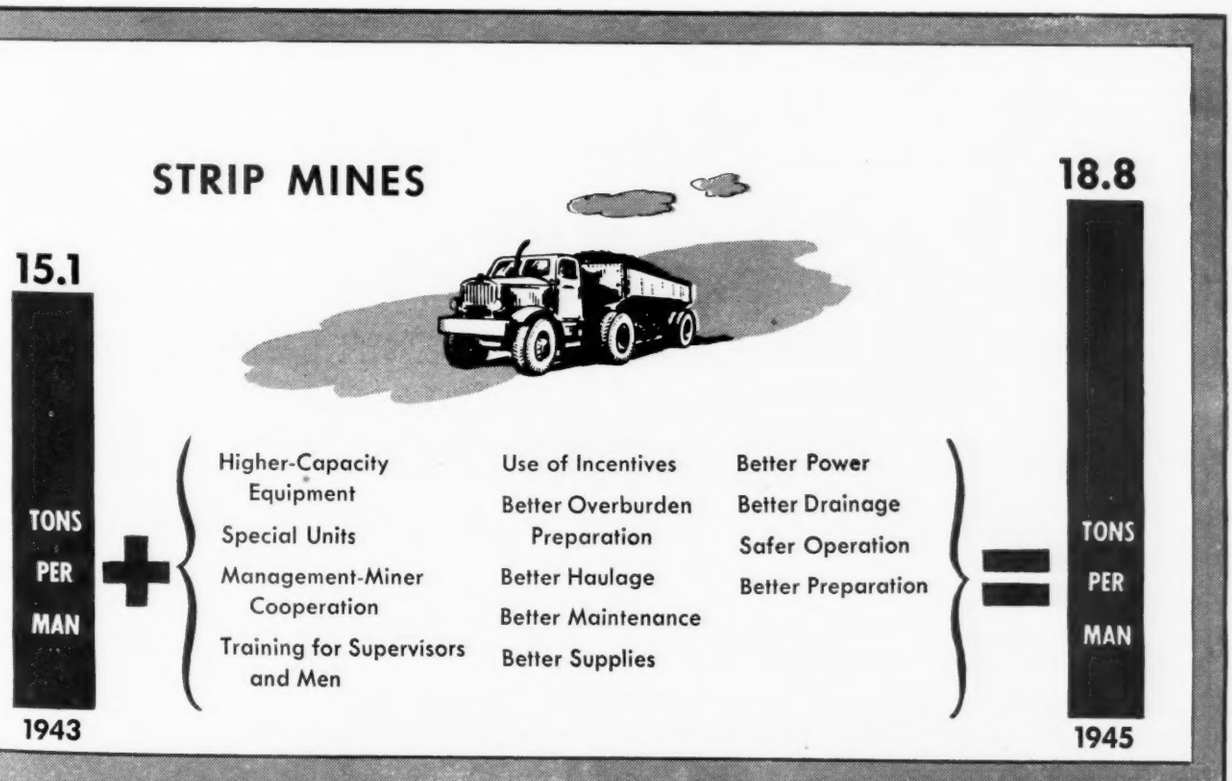
The hand-loading mine, however, was not without its outstanding representatives among the "Coal-for-Victory" award winners, although several of these revealed their intention of partly or completely mechanizing in the near future. But by observing the other principles of good management discussed in this and other sections of this issue the large majority of these operations were able to raise output per man 0.25 to 2.12 tons (6 to 27 percent) from 1943 to 1945.

Installation of mechanical-loading equipment, however, plus better use of existing facilities, were the major factors in efficiency improvements (summarized in the accompanying chart) at the "Coal-for-Victory" operations studied by *Coal Age*. In the group reporting partial or complete mechanization since 1943, aside from one or two showing temporary decreases or no increases because of unusual situations, gains were marked up all along the line. The most striking ones were in coal under 48 in. in thickness, where companies installed hand-loaded conveyors, conveyors with self-loading heads, and loading machines, the latter most often discharging into shuttle cars or conveyors. Few mines in coal under 48 in. reported increases of less than 1 ton per man in the 1943-45 period, with the majority ranging from 1.10 to 3.75 (23 to 74 percent).

In coal over 48 in. thick, operators called on some hand-loaded conveyors but relied largely on conveyors with self-loading heads and track or crawler loaders with large mine cars or shuttle cars. Few reported increases of less than 0.63 ton per man in the period 1943-45, with the top as 2.06 tons. Percentagewise, the increases ran from 12 to 36.

Evidence derived from study of the award winners also supports an even more striking conclusion promising greatly for coal mining in the future. That conclusion is that management can obtain further benefits equaling or exceeding the initial benefits derived from adoption of mechanical-loading equipment. In other words, by revisions in mining plans, better service to loading units, improvements in auxiliary mining activities, changes in types of loading and conveying units to get higher capacity, and equipment better suited to conditions, plus better management, supervision, maintenance and the like (the subjects of other sections in this issue), all but two or three "Coal-for-Victory" mines operating in coal over 48 in. thick and already mechanized in 1943 were able to raise tons per man 1.00 to 3.78 by the end of 1945 (11 to 72 percent).

In mines in coal under 48 in. and already mechanized in 1943, the in-



creases in the 1943-45 period, with one or two exceptions, ranged from 0.59 to 2.15 tons per man (13 to 68 percent). To repeat, these records show not only that mechanical-loading equipment means an increase in productivity but that another equal or better increase can be obtained by care in getting the most from the equipment after it has gone into service.

Personnel—Key Ingredient

Regardless of how much capacity is built into a machine, men must operate it and men must supervise that operation. Therefore, efficiency fundamentally is a matter of men, their skill in their jobs, their capacity to cooperate and their understanding and enthusiasm in their daily work, whether managing or operating. How it works out is evidenced by a few of the many examples supplied by the award winners. In one case, better management-employee relations were a sizable factor, aside from other improvements, in an increase in tons per man-shift from 5.26 to 7.31 in the three-year period 1943-45; in another, 5.0 to 8.0 tons; in still another, 5.9 to 7.23; in a fourth, 5.64 to 6.64, and so on.

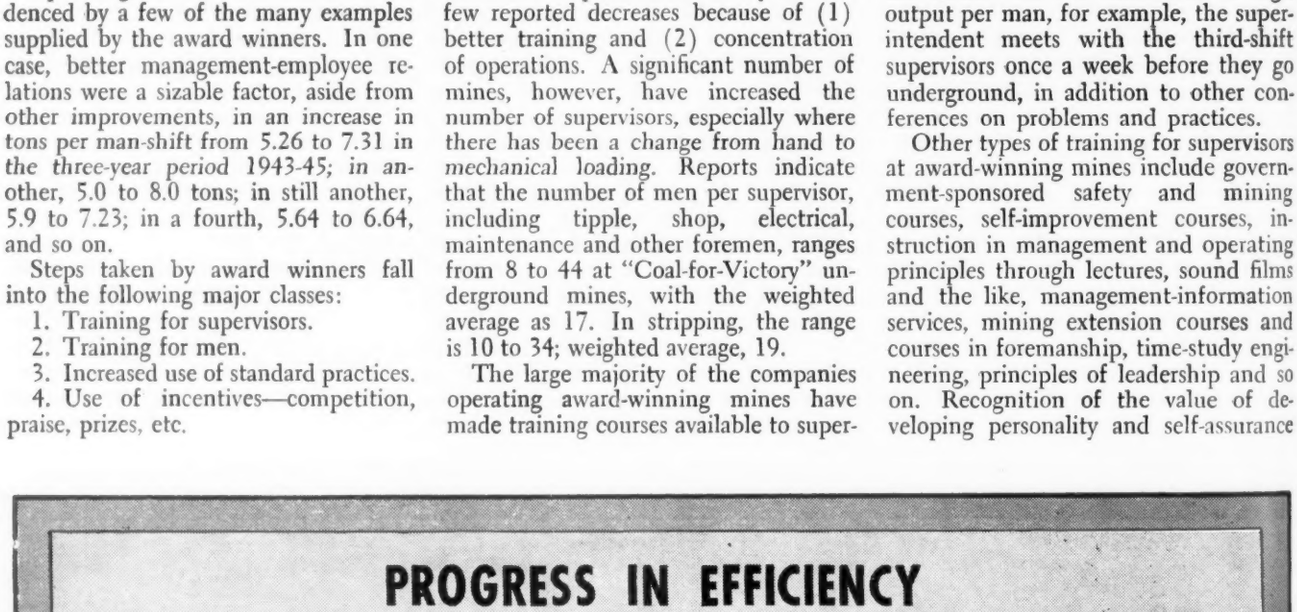
Steps taken by award winners fall into the following major classes:

1. Training for supervisors.
2. Training for men.
3. Increased use of standard practices.
4. Use of incentives—competition, praise, prizes, etc.
5. Last—but not least—deliberate, considered decision by management to promote understanding, good feeling and cooperation between supervisor and miner.

Effective supervision involves, naturally, numbers as well as skill. Many operators have found no increase in the number of supervisors necessary while a few reported decreases because of (1) better training and (2) concentration of operations. A significant number of mines, however, have increased the number of supervisors, especially where there has been a change from hand to mechanical loading. Reports indicate that the number of men per supervisor, including tipple, shop, electrical, maintenance and other foremen, ranges from 8 to 44 at "Coal-for-Victory" underground mines, with the weighted average as 17. In stripping, the range is 10 to 34; weighted average, 19.

The large majority of the companies operating award-winning mines have made training courses available to supervisors—more than 75 percent, in fact. A variety of courses, in addition to the old-fashioned but still good method of the old head guiding the less experienced, have been given at various properties. Job Instruction Training, Job Methods Training and Job Relations Training led in popularity during the war. Another increasingly used means of heightening the effectiveness of supervisors is the "conference" method, which takes several forms but essentially is based on foremen getting together to study their problems under the guidance of a conference leader from within the company or outside. This is an extension of the less-formal and quite common plan of meeting at regular intervals with the superintendent or foremen as the leader. At one mine with a high output per man, for example, the superintendent meets with the third-shift supervisors once a week before they go underground, in addition to other conferences on problems and practices.

Other types of training for supervisors at award-winning mines include government-sponsored safety and mining courses, self-improvement courses, instruction in management and operating principles through lectures, sound films and the like, management-information services, mining extension courses and courses in foremanship, time-study engineering, principles of leadership and so on. Recognition of the value of developing personality and self-assurance



along with technical skills is evidenced by the growing number of self-improvement courses. One operating manager, believing that the mine force will provide the managers of tomorrow, plans a clubhouse with meeting rooms and instructors to permit supervisors to acquire proficiency in self-expression, in getting along with people, whether at home or away, and in other directions leading to greater effectiveness in the managerial field.

Formal training for mine employees has not yet reached the status of training of supervisors, but reports from "Coal-for-Victory" mines indicates that it is growing. This training has two major objectives: (1) development of supervisory timber and (2) greater skill in mine work with consequent increase in efficiency. As an example of the first, one mine has made available special facilities to enable men to qualify for foremen's certificates. In three years, 25 men made certificates and 15 are now employed as bosses.

In the field of increasing skill in mining work, emphasis so far has been laid largely on training of mechanics, electricians and repairmen paralleled by training of mechanical-loading crews on the job by foremen who have first been grounded in operating principles. In at least one case, the principle has been extended by employing instructors who are first inculcated with the rules of safety and procedure laid down in a book of standards. These instructors then take crews in rotation and work with them to raise their productivity by getting closer adherence to standards. As an example of results, the productivity of one crew was raised from 13 to 19 tons per man in six months without a single change in personnel other than shifting some men to jobs more in line with their aptitudes.

Results at "Coal-for-Victory" mines bear out another contention increasingly accepted in coal mining. In other words, organized attempts to promote understanding, build good will and stimulate cooperation between management and men are credited with substantial influence in raising productivity as a result of the miner feeling more that his fortunes are tied to the fortunes of his company and the industry.

One means of reaching that goal is putting the facts before the men—what the industry and the company face, what it means to the miner and what the company and the industry are trying to do to promote progress. Employee publications are an effective method of keeping men posted and the number has greatly increased in late years at award-winning mines. Other methods of keeping men informed include special mailings, bulletins, the radio and independent newspapers, plus talks by company and outside authorities at meetings, rallies, picnics and the like.

Since the objective naturally is to make the employee feel that he is a part of the company rather than just a hired hand, company papers devote much of their space to the doings of employees and their families. That community of interest also is promoted by sponsoring and supporting athletic teams (including supplying uniforms and equipment), providing athletic fields and community meeting places, encouraging employees to participate in community affairs, etc.

This principle has been carried even further to achieve still another objective —recruiting of new men. In other words, several companies have pressed for and participated in the installation of vocational guidance and training courses in the local schools, which not only tend to build public and employee respect for the industry but also give the industry a chance at young men who otherwise might go elsewhere.

Along this same line, several "Coal-for-Victory" mines have adopted special measures for returning veterans to work and interesting young ex-servicemen in mining. At one property, for example, the management makes it a point to see every veteran in the community, whether he worked at the mine before or not. Those who have held jobs get them back as a matter of course and an attempt is made to see if their service career has given them skills that fit them for something better. If so, every attempt is made to utilize those skills.

One mine, also making a point of taking care of disabled veterans as well as the able-bodied, follows a policy of having returning men welcomed by the general superintendent or his assistant at a dinner. When a man is put back on the payroll he goes with the foreman for three days to get acclimated and to get an idea what he may prefer to do. In taking care of the disabled, the mine is installing electric switch-throwers to enable men with both legs off to go to work as motormen. Other special equipment is employed as necessary to carry out the principle that the operation will "take care of its own."

Incentives bulk large in programs for promoting cooperation adopted by award winners. A major one is competition. Bosses, for example, are supplied with realization and cost data at a growing number of operations paralleled by figures on their own performance in relation to the mine average or goal. In one case, the data, in chart form, are mailed to the supervisors' homes to get the advantage of the feminine and family reaction.

Encouraging friendly rivalry between crews and departments takes the form of regular posting of production and

Steps to Better Management-Miner Cooperation at "Coal-for-Victory" Mines

1. Management determination to promote cooperation—lived up to in practice.

2. Concrete evidence of appreciation of mutuality of interest—dinners, picnics, tangible awards.

3. Improvement of working conditions.

4. Management-employee get-togethers and joint management-miner committees.

5. Better training of supervisors in labor relations.

6. Promoting understanding through regular dissemination of facts about the company, its position, its plans and the position and plans of the industry.

7. Recognition of achievement—insignia, feeds, beer busts, cigars, notes on the bulletin board, pictures in the paper and so on.

8. Stimulation of suggestions from employees.

9. Building community of interest through publications for and about the company's employees and the company's doings.

10. Building community of interest by supporting and cooperating in employee and community activities—sports, forums, civic enterprises and so on.

PACESETTERS IN PRODUCTIVITY

"Coal-for-Victory" Award Winners

ALABAMA

Alabama Power Co., Gorgas mine, Gorgas, Ala.
Marigold Coal Mining Co., Marigold mine, Jasper, Ala.
Republic Steel Corp., Sayre mine, Adamsville, Ala.
Stith Coal Co., Aldridge Shaft, America, Ala.
America No. 5 mine, America, Ala.

COLORADO

*Bear Coal Co., Bear mine, Somerset, Colo.
Champion Coal Mining Co., Hawk's Nest mine, Somerset, Colo.
*The Minnequa Fuel Co., Morning Glory mine, Walsenburg, Colo.
*Oliver Coal Co., Oliver mine, Somerset, Colo.

ILLINOIS

Bunker Hill Coal & Mining Co., Bunker Hill mine, Collinsville, Ill.
Chicago, Wilmington & Franklin Coal Co., New Orient mine, West Frankfort, Ill.
Orient No. 1 mine, Orient, Ill.
Forsyth Carterville Coal Co., Forsyth Carterville, Carterville, Ill.
Franklin County Coal Corp., Mine No. 5, Herrin, Ill.
Mine No. 7, Royalton, Ill.
Freeman Coal Mining Corp., Freeman No. 1, Herrin, Ill.
The United Electric Coal Cos., Fidelity No. 11 mine, DuQuoin, Ill.

INDIANA

Knox Consolidated Coal Corp., Knox 1, 2 and 5 mines, Bicknell, Ind.

KANSAS

The Pittsburg & Midway Coal Mining Co., Central cleaning plant, Mines Nos. 15 and 18, Scammon, Kan.

KENTUCKY

Dawson Collieries, Inc., Dawson Collieries mine, Dawson Springs, Ky.
Dawson Daylight Coal Co., Dawson Daylight 6 and 9 mines, Dawson Springs, Ky.
Consolidation Coal Co., Mine No. 155, Van Lear, Ky.
Mine 207, Jenkins, Ky.
*Mine 214, McRoberts, Ky.
Elcomb Coal Co., Elcomb mine, Harlan, Ky.
*The Elk Horn Coal Corp., Elk Horn No. 6 mine, Jackhorn, Ky.
Fayette-Jellico Coal Co., Fayette-Jellico No. 2 mine, Warren, Ky.
Harlan Central Coal Co., Totz, Ky.
Homestead Coal Co., Homestead mine, Earlington, Ky.
Louisville Gas & Electric Co., Cherry Hill mine, Central City, Ky.
*Peerless Darby Coal Co., Darby mine, Splint, Ky.
Republic Steel Corp., Republic mine, Pikeville, Ky.
*Sentry Coal Mining Co., Sentry mine, Madisonville, Ky.
Sizemore Mining Co., Turner No. 3 mine, Drift, Ky.
*Smith & Stokes Mining Co., Blue Valley mine, Madisonville, Ky.
West Kentucky Coal Co., Hecla 1 and 2 mines, Earlington, Ky.
North Diamond 2 and 3A, Earlington, Ky.
North Diamond No. 3, Earlington, Ky.
Poplar Ridge, Sturgis, Ky.

MISSOURI

Huntsville-Sinclair Coal Mining Co., Mark Twain mine, Huntsville, Mo.

MONTANA

Foley Bros., Inc., and Northwestern Improvement Co., Rosebud mine, Colstrip, Mont.

OHIO

M. L. French Coal Co., Charter Oak mine, Pomeroy, Ohio.
Hanna Coal Co., Crow Hollow No. 3, Bradley, Ohio.
*Dun Glen No. 11, Dun Glen, Ohio.
*Georgetown No. 12, Adena, Ohio.
Piney Fork No. 1, Piney Fork, Ohio.
Willow Grove No. 10, Neffs, Ohio.
The Lorain Coal & Dock Co., Blaine mine, Blaine, Ohio.
Moore Coal Co., Cadiz mine, Cadiz, Ohio.
The David Z. Norton Co., Norton mine, Adena, Ohio.
Rail & River Coal Co., Mine No. 3, Aults, Ohio.
Mine No. 6, McClainsville, Ohio.
Ura Swisher, Swisher mine, Cheshire, Ohio.

OKLAHOMA

Seneca Coal & Coke Co., Seneca No. 4 mine, Catoosa, Okla.
Sooner Coal Mining Co., Sooner mine, Oolagah, Okla.

PENNSYLVANIA ANTHRACITE

Pennsylvania Coal Co., Ewen colliery, Pittston, Pa.
Underwood colliery, Scranton, Pa.

PENNSYLVANIA BITUMINOUS

The Buckeye Coal Co., Nemacolin mine, Nemacolin, Pa.
Castle Shannon Coal Corp., Coverdale No. 8, Coverdale, Pa.
Greensburg-Connellsville Coal & Coke Co., Francis mine, Burgettstown, Pa.
Iseman Bros., Iseman Bros. No. 2, New Bethlehem, Pa.
Johnstown Coal & Coke Co., Logan No. 4 mine, Beaverdale, Pa.
Logan No. 6 mine, Beaverdale, Pa.
Portage No. 2 mine, Portage, Pa.
L. C. S. Colliery Co., Inc., Virginia No. 14, Heshbon, Pa.
Pittsburgh Coal Co., Banning No. 1 mine, Van Meter, Pa.
Banning No. 2, Whitsett, Pa.
*Lindley mine, Canonsburg, Pa.
Warden mine, Sutersville, Pa.

safety records plus pictures of record breakers in not only company but independent newspapers. Beer busts, feeds, cigars, presents of hats, shoes, groceries, home appliances and other tangible rewards reinforce other praise for a job well done at a large and increasing number of operations. Presentation may be informal or on a regular schedule but the idea is that praise for good work, even if only a pat on the back and plug on the bulletin board, tends to create good will and a desire to do an even better job in the future.

Work along the same line but not tied to specific record breaking includes regular feeds and picnics for supervisors and employees, at which prizes may be awarded for safety, attendance and the like; annual presents of hats, shoes or goggles as evidence of the company's interest and appreciation of the efforts of the employees as well as Christmas turkeys, cash bonuses and other tangible evidences of company sincerity.

The special field of promoting attendance and regular work has brought forth efforts to improve car service, power, maintenance and other phases of mine operation, as well as working and safety conditions, to make the man's job easier, plus attempts to make sure that he gets a day's work at something else if conditions prevent him from completing the shift at his regular job. In addition, a number of mines have found pins, badges, colored hats, rings, bonds and insurance policies helpful not only in promoting attendance

Reitz Coal Co., Reitz No. 3B mine, Central City, Pa.
*Reitz No. 5, Scalp Level, Pa.
Republic Steel Corp., Crescent No. 2 mine, Charleroi, Pa.
Brownsville Junction mine, Brownsville, Pa.
Rochester & Pittsburgh Coal Co., Lucerne mine, Lucernemines, Pa.
Helvetia mine, Helvetia, Pa.
Sagamore mine, Sagamore, Pa.
Waterman No. 2 mine, Homer City, Pa.
Victoria Coal Co., Johnson mine, Monessen, Pa.
*Weirton Coal Co., Isabella mine, Isabella, Pa.
Westmoreland Mining Co., Graff 1-2, Blairsville, Pa.
*Roaring Run mine, Apollo, Pa.
*Watson mine, Mooween, Pa.
Zeth Coal Co., Zeth mine, Hopewell, Pa.

TENNESSEE

Fentress Coal & Coke Co., Wilder No. 5 mine, Wilder, Tenn.
Pruden Coal & Coke Co., Back Creek No. 2 mine, Pruden, Tenn.

UTAH

*Nyman Coal Co., National mine, National, Utah.
Standard Coal, Inc., Standard mine, Standardville, Utah.

VIRGINIA

Great Valley Anthracite Coal Co., Great Valley mine, McCoy, Va.
H. E. Harman Coal Corp., Harman mine, Harman, Va.
Jewell Ridge Coal Corp., No. 1 mine, Jewell Ridge, Va.
Stonega Coke & Coal Co., Derby colliery, Derby, Va.
*Derby No. 1 mine, Derby, Va.
Imboden mine, Imboden, Va.
Roda No. 5 mine, Roda, Va.

WASHINGTON

Franklin Gem Coal Co., Black Diamond, Wash.
Monarch Coal Mining Co., Monarch mine, Centralia, Wash.

WEST VIRGINIA

Ames Mining Co., Ames mine, Fayette, W. Va.
Mingo Division, Thacker Mines, W. Va.
Amherst Coal Co., Amherst 3-B, Accoville, W. Va.
Buffalo Eagle Mines, Inc., Riley 1 and 2, Braeholm, W. Va.
Buffalo Winifrede Coal Co., Buffalo mine, Chattaroy, W. Va.
Carbon Fuel Co., Mine No. 3, Carbon, W. Va.
Mine No. 5, Jochin, W. Va.
The Davis Coal & Coke Co., Mine No. 37, Coketon, W. Va.
Elk River Coal & Lumber Co., Rich Run mine, Rich Run, W. Va.
Fairpoint Construction Co., Bridgeport mine, Bridgeport, W. Va.
The Gauley Mountain Coal Co., Ansted No. 2, Ansted, W. Va.
Rich Creek 1-3, Jodie, W. Va.
Island Creek Coal Co., Island Creek No. 1, Holden, W. Va.
Island Creek No. 15-A, Holden, W. Va.
Island Creek No. 16, Holden, W. Va.
Lando Coal Corp., Lando mine, Lando Mines, W. Va.
The Lorado Coal Mining Co., Lorado mine No. 1, Lorado, W. Va.
*Lorado Mine No. 2, Lorado, W. Va.
Marianna Smokeless Coal Co., Marianna Mine No. 1, Marianna, W. Va.
Marianna Mine No. 2, Marianna, W. Va.
*Marmet Coal Co., Cedar Grove No. 1 mine, Hernshaw, W. Va.
Mountain Fuel Co., Glen Cambria mine, Flemington, W. Va.
Pardee & Curtin Lumber Co., Bolair mine, Bolair, W. Va.
*Bergoo No. 3 mine, Bergoo, W. Va.
Pond Creek Pocahontas Co., Pond Creek mine No. 3, Bartley, W. Va.
*Pond Creek Mine No. 1, Bartley, W. Va.
Pursglove Coal Mining Co., Pursglove No. 2 mine, Pursglove, W. Va.
Pursglove No. 15, Pursglove, W. Va.
Red Parrot Coal Co., Mine No. 2, Prenter, W. Va.
Red Cedar mine, Prenter, W. Va.
*Ruthbell Coal Co., Deep Hollow mine, Kingwood, W. Va.
*West Virginia Coal & Transportation Co., Jeanne Anne mine, West Columbia, W. Va.
The Weyanoke Coal & Coke Co., Arista mine, Arista, W. Va.
Wilcox Coal Co., Wilcox mine, Daniels, W. Va.
York No. 1 mine, Clay, W. Va.

WYOMING

Sheridan-Wyoming Coal Co., Inc., Miller mine, Kirby, Wyo.
*Monarch mine, Monarch, Wyo.
The Union Pacific Coal Co., D. O. Clark mine, Superior, Wyo.
Stansbury mine, Stansbury, Wyo.
Winton mine, Winton, Wyo.

Asterisks (*) indicate winners of both 1944 and 1945 awards.

SALUTE AND APPRECIATION

This issue of *Coal Age* is strictly the work of the men in the industry — the men whose money and mental effort enabled coal to do one of the outstanding jobs of all industry in supporting the war effort and preparing for progress in the future. It honors the accomplishments of these forward-looking mining men — particularly those whose achievements earned their operations the *Coal Age* "Coal-for-Victory" awards — and presents their contributions in the vital fields of increasing mining efficiency and safety. In saluting these men for their outstanding accomplishments *Coal Age* also takes this opportunity of expressing its sincere appreciation of the very real help rendered by them in making possible this "Mining Efficiency Number."

but in attaining a higher degree of safety. Membership in safety clubs and societies, sometimes carrying with it insurance or other benefits and the right to wear special insignia, also has proved a powerful incentive to safer operation.

Several managements have supplemented other work by sponsoring and participating in special labor-management committees. As a sidelight, incidentally, some managements take their problems to the pit committees instead of waiting for the committees to descend on them. They report such a policy to be quite effective. Operating with a labor-management committee requires study and skill, but where a successful basis has been achieved the results have been found to warrant considerable effort, such as the practice at one mine of shutting down half an hour once a week for meetings on production and efficiency between bosses and men. At another operation, the superintendent and men meet for 45 minutes before each meeting of the local.

With good relations, there also is a better opportunity for cashing in on ideas developed by the men themselves. This is reflected in an increase in adoption of suggestion systems. One plan brought in 17 in the first six weeks, many of which were adopted. Suggestions are passed upon by a committee of one man representing management and two representing employees, with power to make awards up to $25. Over $25, the recommendation is referred to the management for approval.

PLANNING For Efficiency

WHILE NOT absolutely correct, there is considerable truth in the long-standing contention that the mining plan, in the broadest sense of the term, has a great deal to do with the maximum efficiency that may be attained by men and equipment. Many "Coal-for-Victory" award winners have found original layouts for their mines or individual working sections still satisfactory. A number have discovered, however, that revisions in layout have promoted more efficient utilization of both manpower and equipment. Aside from room and panel layouts for loader and conveyor operation—treated in subsequent sections of this issue—these revisions have been undertaken to accomplish:

1. Shortening of underground man-travel distance.
2. Concentration of active workings.
3. Retreat operation.
4. Higher efficiency in development.

RAISING TIME AT THE FACE

More time at the face means more coal for the same wage bill and, consequently, lower cost. More time at the face can be obtained by reducing travel time.

Reductions of as much as five miles in man travel have increased actual production time at the face as much as four hours in a three-shift day at "Coal-for-Victory" mines. Theoretically, this means 20 percent more tonnage with no increase in the total underground payroll, or the same tonnage with a 20-percent lower payroll. Practically, the benefits are not quite as great but, nevertheless, they are important enough for several operators to spend, or plan to spend, large sums to decrease the percentage of the shift spent in traveling.

One mine, for example, cut travel distance five miles. This cut was achieved by putting down a new opening at the back of the property and removing all surface facilities, except for the preparation plant, to it. Consequently, the new opening was accompanied by a new washhouse, shop, supply room, supply yard and other facilities that, incidentally, being strictly modern, played their own part in raising efficiency. The new opening made it possible to get 24 hours at the face per day against 20 to 21 hours before. This, plus some revisions in mining equipment, changes in the mining plan and transfer of equipment and men from another operation to consolidate the two, was reflected in an increase in tons per man-shift from 5.45 in 1943 to 6.21 in 1945.

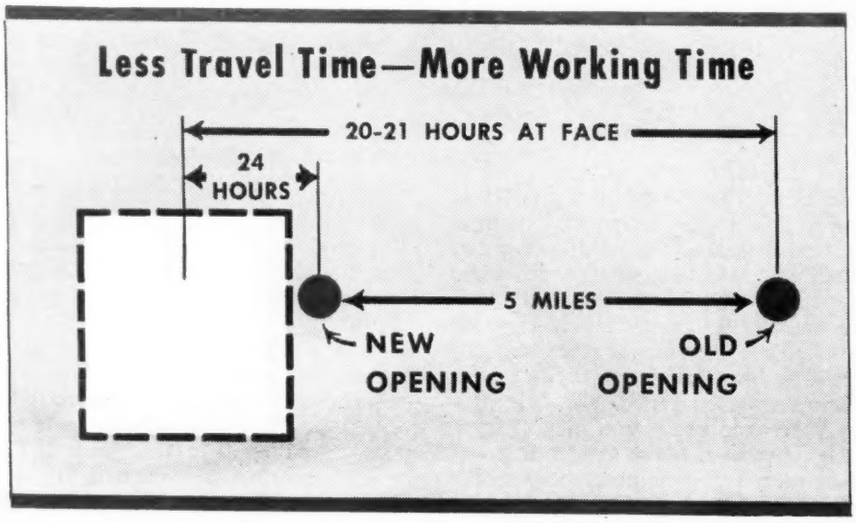
New drifts for entrances are made at regular intervals at another operation. Free buses take the men from the lamphouse to these drifts, from which the men walk to their working places in about five minutes. A bathhouse and portal were reopened at another mine to cut travel time 50 percent.

Even where new openings were not made, several operators were able to improve materially their travel situations. Concentration of workings was the answer in most cases, this concentration permitting a reduction in number of mantrips, better scheduling with less interference with haulage and an immediate return load with a minimum of lost working time.

CONCENTRATION FOR EFFICIENCY

Higher tonnage from a smaller area decreases cost of service facilities (track, wire, etc.) and service labor and increases efficiency of face units by making possible better supervision, better scheduling and better service.

Concentration, as previously pointed out, has been accomplished not only within mines but by consolidation of operations for better utilization of manpower and equipment. Such consolidation, where possible, reduces the size of the service staff (haulage, maintenance and other men) and makes possible better utilization of such facilities as haulage and shop equipment, preparation plants and the like. As previously noted, consolidation was a factor in one case in an increase of 14 percent in tons per man-shift in three years at the one



operation alone, with an even higher increase on the basis of the combined results at the two properties previously operated.

Concentration within individual mines, with greater output from a smaller, closer-knit territory, has been found at a number of properties studied to have yielded most or all of the expected economies in supervision, haulage, track, wire, ventilation, pumping and drainage, supply handling, maintenance and other items. Concentration, of course, involves keeping all the working sections together, no leaving of areas more difficult to operate than normal (usually meaning an increase in recovery by mining coal that otherwise would be partly or wholly lost) and avoidance of scatter-shot development. It also involves putting as much equipment in a section as that section will support without a decrease in output per man or machine, as well as working the section one or two shifts more per day. All these methods are being employed increasingly at "Coal-for-Victory" mines and have played their parts in raising efficiencies, although the exact percentages for which concentration is responsible are difficult to separate out.

Two Vs. Three Shifts

A somewhat different type of concentration was practiced at several mines during the war and is being considered by some operators for the future. In the war period, when manpower scarcity prevented complete manning of three shifts a day, some mines cut back to two to get a better output per man-shift by utilizing to a fuller extent the capacity of the equipment and the abilities of men in such auxiliary operations as haulage that had to be manned the same regardless of tonnage. Since it also is more difficult, in the opinion of many managers, to get the same efficiency from the third as the other two shifts, dropping back to two was held to benefit average productivity in that direction also—a factor, along with a better opportunity for inspection and maintenance, in thinking for the future at several other properties contributing to this issue.

Other authorities argue that the third shift need not be less efficient and contend that dropping from three to two shifts indicates more the importance of fully manning producing facilities as a step to higher efficiency. Both considerations, however, were felt to be factors in one case, where cutting from three to less than two shifts was held to be largely responsible for raising production per man-shift (conveyor operation, 38-in. coal) from 4.67 tons in 1943 to 6.02 in 1944.

Retreat Mining—Major Factor in 60-Percent Increase in Tons per Man in Three Years

Note:
Diagrammatic; not a reproduction of actual map

LOW COST THROUGH RETREAT

Trouble is left behind and the best possible conditions for low cost are maintained throughout mine or section life by driving to the boundary or other limits and working back.

Few mines in the United States are yet on full-retreat operation but indications are that the percentage runs higher among "Coal-for-Victory" winners. Some have approached the goal rather closely even though hampered during the war in the necessary revisions in mining plans by the heavy demand for fuel. Several others plan full retreat for the remainder of the mine life, while others have set this up as the goal in opening new coal acreages.

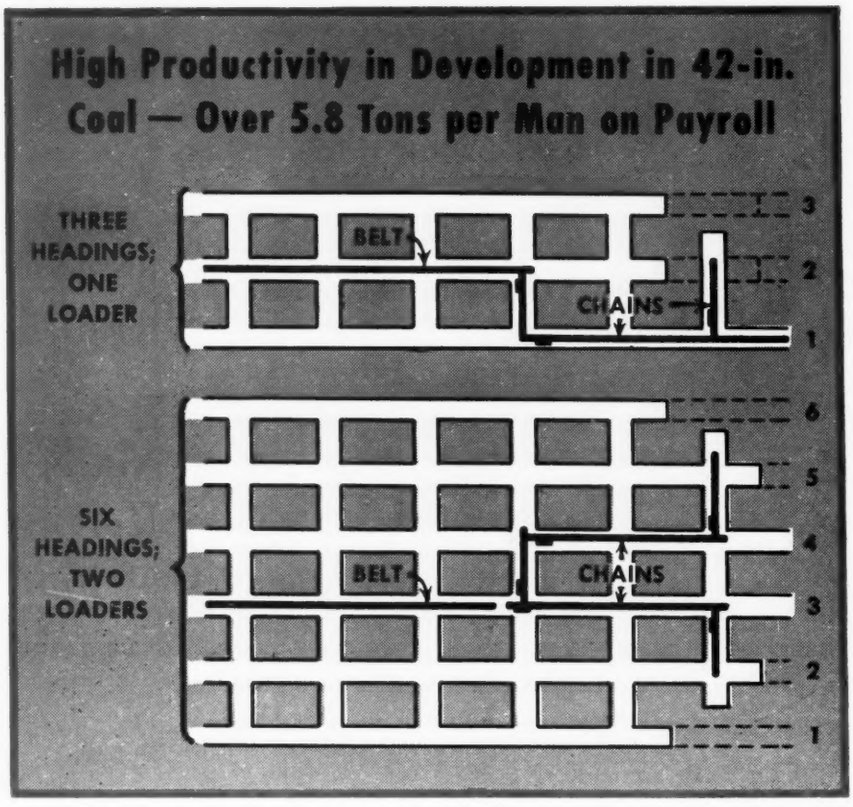
In one operation reconstructed practically in its entirety, a modification of the full-retreat system, plus a close approach to complete concentration, were responsible to a considerable extent for a 60-percent increase in tons per man-shift in 1945 as compared to 1943, in which period approximately 15 percent of the man-shifts worked were plowed into reconstruction for the postwar future. To get onto the new system, the main entry was driven to the back of the property and about two-fifths of the coal was taken on one side on the advance. This permitted not only maintaining but increasing output while development to the boundary of the acreage proceeded. The remaining three-fifths of the coal is being mined full retreat. Trouble is left behind and cost, instead of increasing with increased distance, will decrease in the future, when it may be more necessary, as the mine gets closer to the preparation plant, especially since all boreholes and other facilities were installed as the main entry was driven to the back of the property.

Substantially similar benefits, naturally on a smaller scale, also have followed increased adoption of retreat operation in room entries and panels, as well as in larger sections made up of several entries or panels. In panel work, also, retreat operation facilitates leaving "fire" or "squeeze" pillars and sealing.

High-Tonnage Development

Making development work as nearly like room mining as possible and mechanizing it with appropriate equipment increases productivity with consequent over-all reduction in mining cost.

Development at "Coal-for-Victory" mines also has been subject to the same degree of mechanization and revision of working plans as face operations—in a few cases more so, since these properties furnish several examples of loading machines and conveyors developing for hand mining pending further expansion of mechanized facilities. A few special entry drivers are employed, along with a few rock machines, but the majority of the properties employ the same types of units for entry driving and rock work



as for coal work in rooms and pillars. Some, however, depart from the rule by using loading machines to develop for conveyors or vice versa.

Ventilation, shortening of man travel and convenience in handling supplies have been the major reasons for most of the new slopes and shafts sunk at "Coal-for-Victory" mines. One slope for reducing man travel furnishes a late example of mechanized mucking during sinking. Equipment included a three-drum slusher and belt conveyor. Average sinking rate was 6 ft. per shift—a considerable increase over the rate normally expected with hand mucking into cars.

Several of the shafts recently put down have employed boreholes into the workings as guides and as a means of facilitating mucking by dropping at least part of the material through the hole and handling it with a loading machine underground. Even where loading underground was only incidental, engineers report that the cost of drilling is more than returned through better ventilation and almost complete elimination of the water problem. In one case, a 65-ft. shaft was sunk with a clamshell on the surface, supplemented by raising from underground with a loading machine. The lining is a sand-cement coating, which has been proved out by experience at several other air shafts put down by the company.

In developing underground, "Coal-for-Victory" award mines furnish many examples of (1) the benefits to be derived from mechanized operation, (2) the advantages normally to be expected from an increased number of places in mechanical loading and (3) the trend toward additional openings for better ventilation. For the latter purpose, several mines have raised the number of headings making up a room, butt or panel entry from two to three or four. Variations include narrowing the outside headings and widening the center to facilitate track laying and haulage; narrowing all headings to cut roof trouble and improve conditions over the life of the entry; and assignment of permanent timbering to entry-driving crews.

In contrast, a few mines have gone from a larger to a smaller number of headings per entry. In two or three cases, two places, except where other considerations govern, have been set as the standard for a loading unit as a result of experimentation indicating that a higher output per man could be secured. At another operation, the number of headings was reduced from six to four or three because it was felt that the larger number represented increased exposure and required too much maintenance.

That mechanized entry driving can yield efficiencies corresponding to those attained in room work even though the number of headings is no more than the usual two or three is proved by results at several "Coal-for-Victory" mines. One, for example, operating in 31-in. coal and solely on development for 2½ years installed loading machines in 1944 and 1945 and later supplemented them with chain conveyors for gathering and loading the coal into cars. Each loader is assigned three headings of a six-heading entry, in one of which 2½ to 3 ft. of top is taken for car haulage. Output per man per day, all men on the mine payroll, increased from 4.7 tons in 1943 to 5.8 in 1945.

Except that belt haulage is used, substantially the same equipment and methods are employed in another operation in 42-in. coal with substantially the same results in increased output per man. Arrangement of equipment for three- and six-heading entries is shown in the accompanying illustration.

Operations providing five, six or more headings for an entry-driving unit include one in 41-in. coal employing loaders and rubber-tired haulage units. Main entries consist of seven headings; panel entries, five to seven. The number in both cases formerly was three. All are driven 20 ft. wide except the heading in which the track is laid, which is narrowed to 12 ft., with the top taken for height. Crews comprise eleven men and the output is 20 to 25 tons per man. Rubber-tired hauls (two units per loader) are kept to less than 200 ft. and units are rounded out by a car-loading elevator, trip-spotting hoist, shortwall with crawler truck and hand-held drill.

Flexibility the Goal

Along with seven headings per entry, another mine recently extended into virgin territory follows a development scheme designed to provide the maximum in flexibility in working room panels. Briefly, the area to be worked is first outlined by driving clear around it on all four sides, the seven headings giving efficiencies as good as or better than regular room-and-pillar mining. In this operation, grades of course are ascertained and the panel may then be developed from the side offering the best prospects from the standpoints of grades and drainage. The plan then is to drive across the block, cut through to the return aircourses and then mine rooms and pillars on the retreat. From the ventilation standpoint, air is overcast into the panel and then goes on through and across the pillar area directly to the return, meaning one-way circulation with everything in fresh air and no return in the working area.

Raising number of headings from two to four and the width of two from 12 to

21 ft., accompanied by an increase of four men in crew size, increased output per loader per shift 50 tons at a mine in 59-in. coal. With rooms for car storage and room necks (driven two or three cuts on the advance), the number of places never is less than six. The plan at this mine is shown diagrammatically in an accompanying illustration. It will be noted that the headings are stepped rather than being driven abreast, and that pairs of rooms are driven up at intervals on alternate sides for empty- and loaded-car storage in both advance and retreat work. Stepping the places means that driving ahead of the last open crosscut is reduced to a minimum.

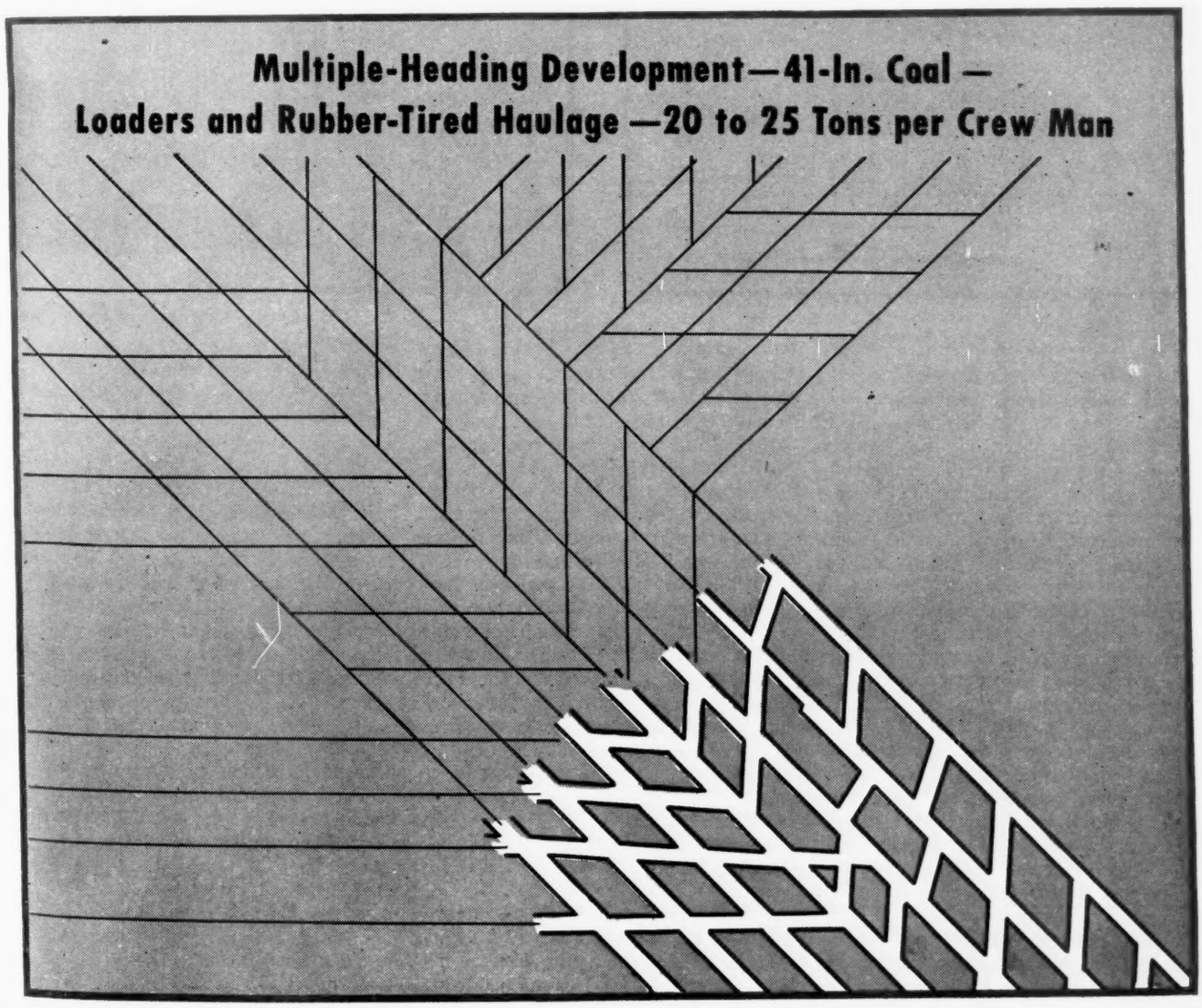
Spearhead development at another operation is designed to provide 12 to 14 places in entry driving as compared to 18 to 20 places in room-and-pillar work. Advancing on a spear front also means that heading faces are never more than one crosscut ahead of the last open crosscut, as shown in an accompanying illustration. In other words, crews are "always driving for air."

Special heading-driving equipment supplements conveyors for room work and slusher and track loader units for cleaning up headings, handling top material and similar jobs at another mine in 62-in. coal. Primarily to provide additional escapeways, the number of room-entry headings has been increased to six, with even more planned in some instances. Crawler loaders served by single cable-reel shuttle cars do the entry driving. Shuttle cars were selected because they rendered track work unnecessary, increased flexibility and provided increased driving speed. Compared to loading into mine cars, output per man-shift increased 4 tons with shuttle cars.

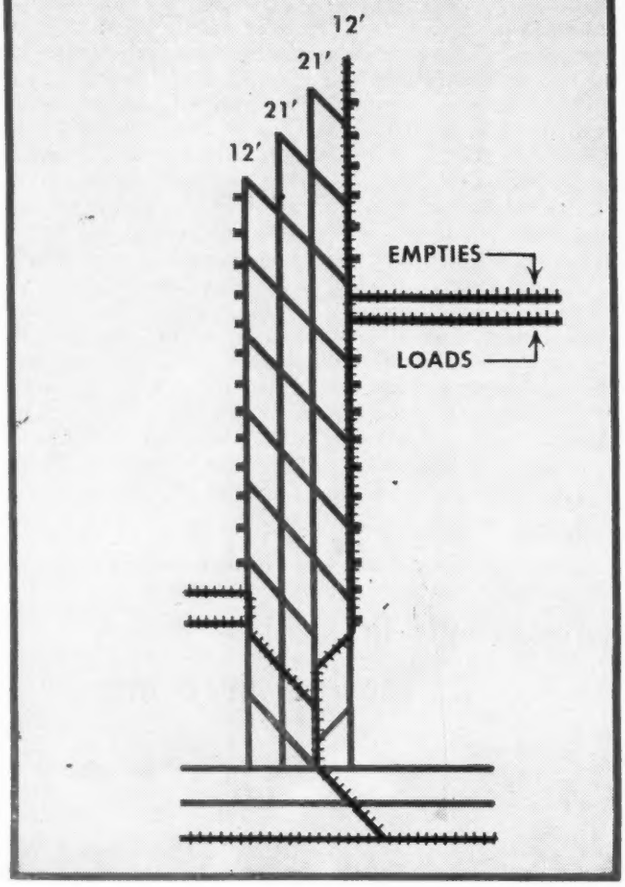
Where conveyors are employed and also are used for development, the pressure for increasing headings is reduced and consequently the usual number is three. Since the general practice is to accompany conveyors with short gathering units or longer belts, room and gathering or mother equipment together make up a unit. Depending upon whether the conveyors are hand loaded or are equipped with self-loading heads, the advance normally is two to four cuts per place per shift. At one mine in 56-in. coal, for example, average advance is four cuts 6 ft. deep and 24 ft. wide per shift with self-loading heads on shakers feeding to mother belts.

Variations from the general system of face conveyors feeding to gathering or mother conveyors include two conveyors advancing headings and another driving an "air room," or auxiliary aircourse, forward to the next room entry. In the majority of cases, the practice is to drive the entry to its limit, including installation of the belt or track and other facilities, and then mine the room or rooms and pillars on the retreat. There are, however, some departures, a few of which will be briefed later in this issue.

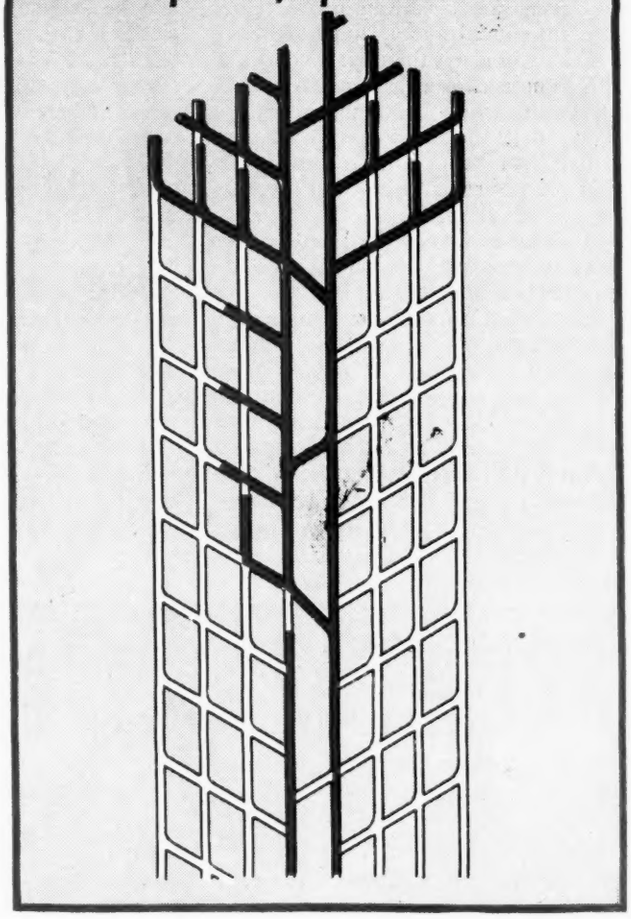
While the tendency, as stated, is to



Four Instead of Two Headings: 50 Tons More per Shift



High-Tonnage Multiple-Heading Development; Spearhead Front



keep the number of headings in conveyor entries down, one property increased them for a somewhat different reason. Previously, it had been running three headings per entry (conveyors with self-loading heads and mother belts), yet it was working four rooms (two on each side) on the retreat. This involved, when the entry was completed ready for room work to be started, horsing a complete conveyor in to the end of the panel and setting it up. Now, four headings are driven and when they are completed all four conveyors are on the ground ready to be set up in rooms.

In handling rock in entry development, "Coal-for-Victory" mine operators generally find standard equipment and methods satisfactory. In a few instances, slushers or loading machines are employed for entry driving and taking rock for height in hand or conveyor operations, as well as in clean-up work, or vice versa. As a general rule, the top or bottom rock is taken each cut and loaded out, although a number of mines shoot everything together, as outlined later in this issue. The exceptions to taking rock each cut include an operation using chain conveyors that advance headings 300 ft. Then, in the heading where the track is to be laid, 18 in. of drawslate and sandstone is taken down and gobbed along the ribs (18-ft.-wide place) by hand.

While air drills normally are employed where bottom is taken, one mine reports greatly reduced labor by substituting hand-held coal drills with special 16-in. augers sharpened by the blacksmith. Thickness of bottom taken is 12 in. The secret of the coal drill is using a plank or the pry against the roof to put weight on the auger and make it cut rather than whirling in one place and wearing the bits.

Among the properties adopting special or different equipment from that employed in rooms to meet the rock problem in entry driving is one recovering a 36-in. seam overlaid by 30 in. of drawslate and 12 in. of top coal. The top material is held in rooms, where chain mother and room conveyors are employed because of less contamination of the coal with refuse and a greater size yield. A loading machine, however, was installed for speed and efficiency in entry driving and, including handling the top material, results in a 5.6-percent higher coal tonnage per man-shift than in room work. In entry work, the coal is first undercut, shot and loaded, after which the 42 in. of top material is brought down for loading to complete the cycle. Crossbars are set as a further protection under the main top at this mine.

Cleaning up old entries occasionally has been necessary at "Coal-for-Victory" mines, in which case standard equipment normally is employed. One company, using rubber-tired haulage, reduced the problem by limiting clean-up to one heading and driving two others parallel to it to sweeten the job with some coal. In virgin work, this company finds it profitable to use two rubber-tired units behind a loader in four-heading entries.

MACHINE METHODS For High Productivity

MECHANICAL loading and conveying equipment, by substituting machinery for muscle, can, as pointed out in an earlier section in this issue, bring about a substantial increase in individual productivity. As also pointed out, however, installation benefits by no means exhaust the possibilities, as the experience of numbers of "Coal-for-Victory" award winners proves. Among the means of getting the extra benefits are:

1. Balancing of equipment capacities to eliminate bottlenecks.
2. Proper manning of units.
3. Ample coal in a territory and maximum possible tonnage per fall.
4. Mining plans suited to the equipment and the job.
5. Good transportation service.

EQUIPPING AND MANNING FOR HIGHER EFFICIENCY

Increasing equipment capacity, bringing the various units into balance with the loader and adjusting crew size to the job result in maximum tonnage and highest individual productivity.

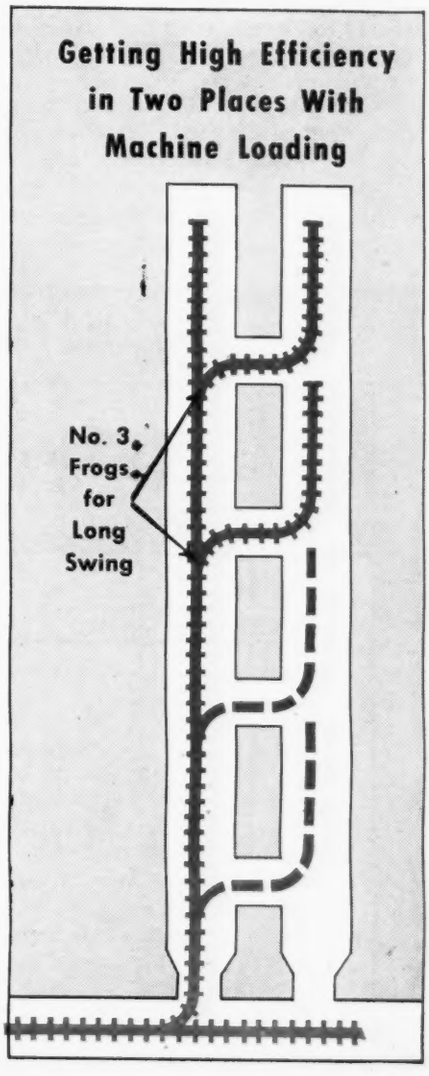
Since loading normally is dependent upon the speed with which auxiliary operations are carried on and the quantity of coal they make available, it is not surprising to find this phase of the problem receiving much attention at "Coal-for-Victory" mines. However, some, with a long history of mechanical loading, also have gone at the problem by first taking a look at their loading or conveying equipment. In many cases, this look has shown it to be suited to the job. In others, some changes have been made. One mine, where tons per man went up from 5.36 in 1944 to 8.38 in 1946, changed loading-machine types, finding that the new units get around 100 tons more per shift under identical conditions. The new units also are accompanied by other late-type auxiliaries, such as track-mounted cutting machines that permit shearing and yet cut an average of four more places per shift, in addition to providing an additional 2 ft. of depth.

Because of abrupt rolls and other difficult natural conditions, one mine in 40-in. coal transferred loading machines to another operation and went to hand loading onto conveyors feeding onto mother belts, which resulted in more tons per man, generally higher efficiency around the mine and lower cost. The same principle was followed in converting another property (40-in. coal) from hand loading, which resulted, among other things, in raising tons per man from 5.04 in 1943 to 6.50 in 1945. Places are turned 90 deg. on one side and 60 deg. on the other to get favorable grades, with chain units being employed when it is necessary to pull coal uphill. Pitch also was factor influencing a change from loaders to shakers at another property. Self-loading heads, however, still provide machine-loading, advantages.

"Coal-for-Victory" mines using loading machines have devoted much thought to two auxiliary operations that otherwise can act as bottlenecks: cutting and transportation. Many have bought new, higher-capacity track cutters or shortwalls, usually with 8- to 9-ft. bars. Bars on existing equipment generally have been lengthened 1 to 2 ft. and apparently few use anything under 7½ ft. In transportation, few employ cars with a capacity of less than 5 tons and several run to 10 tons or more. Many have gone to rubber-tired haulage with 2½- to 10-ton units and others, particularly in thin coal, use chain and belt conveyors behind loaders.

Thickness of the coal at "Coal-for-Victory" mines using loading machines of the track or crawler type ranges from 36 to 144 in. Tons per man ranged from 4.41 to 12.87 in 1943 and from 4.45 to 13.70 in 1945. Some of the outputs of over 12 tons incidentally were in seams 54 to 74 in. thick.

Mines using hand-loaded and self-loading conveyors also lengthened cutter bars and improved transportation, largely by installing mother belts with room units. Thickness of the seam ranged from 30 in. up to 10 ft. or more in pitching areas. Tons per man-shift varied from 3.14 to over 12 in 1943 and from 3.82 to over 13 in 1945. One of the operations reporting more than 12 in 1945, incidentally, was in 42 in. of



coal with hand loading onto the conveyors.

Changes in crew sizes were in the minority and were in both directions in both loading-machine and conveyor mines. Several loading-machine operations reported increases of one to three men to fill out war-depleted crews. A few reported intentions to add as many as six to eight men to get more tonnage from the existing units or to take care of new and higher-capacity equipment. One mine planned to increase crew size from 16 to 20 men, which was expected to raise loader output from an average of 12 places about 30 tons per shift. Higher-capacity equipment — approximately 100 tons per shift—was responsible for an increase of 9 to 13 men at another property.

Changes downward were more numerous than upward, and included such ones as taking off a utility man and assigning his duties to others on the crew. Reduction in number of working places was accompanied by reductions in crew sizes at other operations, such as from five to two places per loader and nine to seven men and ten or more to five places and 13 to 12 men, in all cases with substantial increases in individual productivity.

Revisions in mining practice and equipment also played their part. At one mine where a change was made to shooting and loading the top slate with the coal, rather than handling it separately, and a hoist was substituted for a locomotive in spotting trips for loading, crew size was cut from 16 to 12 men with no decline in coal tonnage. At another property, the war forced a cut from 21 to 17 men while tons per machine shift went up. Now, one unit is operating with 14 men as a result of adoption of a drilling machine with powered swing and a timber-setting truck and it is planned to standardize on this number.

Fewer changes in crew size took place in conveyor mining, as might be expected. In some cases, tighter supervision, better care in selecting and assigning men and experience permitted cuts. In another, for example, a change was made from four men per place to five for two places, with an increase of about 1½ tons per man per shift. On the other side, a change to a stepped face, resulting in better cycle, permitted increasing the crew from three to four with a higher productivity.

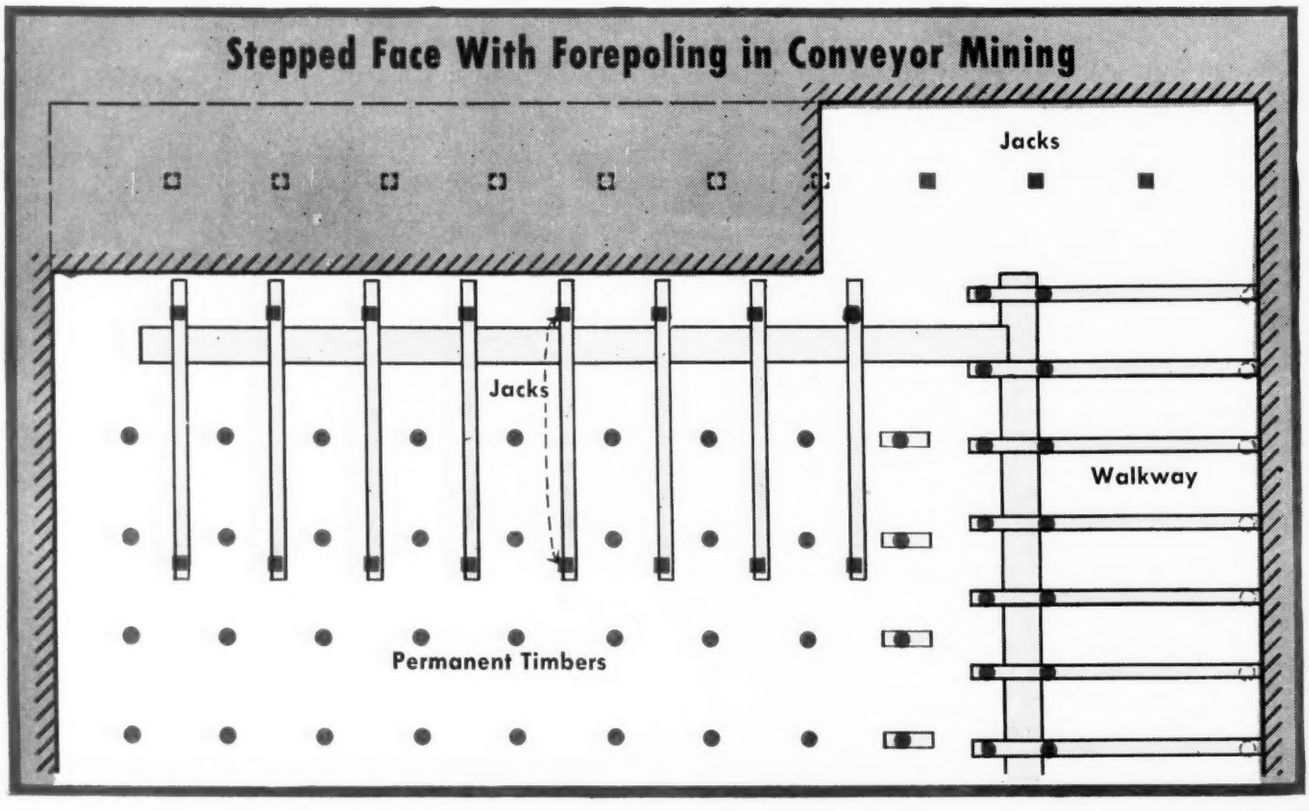
COAL FOR HIGH OUTPUT

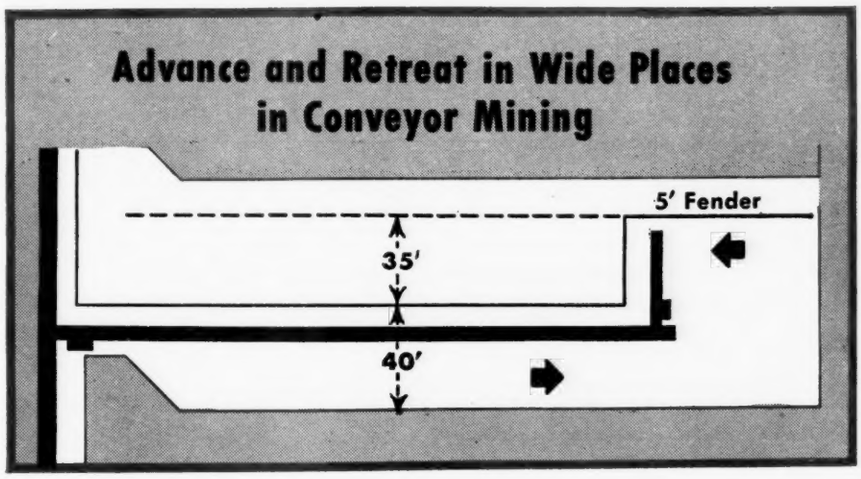
Ample working places with maximum tonnage per fall set the stage for higher efficiency in machine mining.

Where mechanical loading is the practice, increasing tons per fall normally reduces the number of loading-machine moves and the number of times the cycle must be repeated in conveyor operation, thereby raising the time that can be spent in loading, with consequent increase in efficiency. In loading-machine operation, also, the numbers of places must be sufficient to prevent interference between the various units.

Operations of "Coal-for-Victory" mines generally are moving in the direction of more places per territory, but there are several outstanding exceptions. The average in coal of the usual thickness seems to lie somewhere between 10 and 15 places, with a number going up to 18 to 20. In the other direction, several mines with big loaders, big cars and other equipment to match find four or five places sufficient.

Several properties, usually in the thinner seams, have dropped number of places per loader from five or more to two while increasing tons per man-shift substantially. One in 47-in. coal cut from five to two places, which step was in large part responsible for increasing tons per man-shift from 7.3 in 1943 to 7.75 in 1944 (worked out in 1945). Another in 43½-in. coal, also employing some hand-loaded conveyors, made the same cut. Tons per man-shift rose from 5.06 in 1943 to 8.81 in 1945. A third, which also went to two places in 70-in. coal and also employs a few hand-loaded conveyors, reported 5.76 tons per man-shift in 1943 and 7.76 in 1945. Spur tracks for changing are put in every crosscut at these operations, as shown in the accompanying illustration. At an-





other mine in 60-in. coal, number of places was reduced from ten or more to five; crews from 13 to 12. Tons per man-shift rose from 4.54 in 1943 to 4.99 in 1944.

In conveyor mining, number of units operated together varies from one to ten. A substantial list of conveyor mines employ units consisting of two room conveyors and a gathering or mother unit. Equally popular are four-room units, with six apparently next in favor.

Along with operation of eight and ten self-loading conveyors per mother belt, one mine in 62-in. coal has materially changed panel specifications, which, with rubber-tired entry-driving, shortening man travel, consolidation, etc., has raised tons per man-shift from 5.45 in 1943 to 6.21 in 1945. Length of panel entries was changed from 932 to 1,500 ft., increasing number of rooms from 18 to 30. Room width was increased from 26 to 30 ft., centers from 36 to 40 ft., and length from 250 to 267 ft. Time between moves was raised from 2½ to five months, increasing annual output per belt some 2,000 tons.

At another operation in 36-in. coal, where tons per man went from 6.45 in 1943 to 7.89 in 1945, shortening moving time by having every man in the right place, everything ready to go and good supervision was given major credit for the improvement. Conveyors are hand loaded and two are used per mother unit.

Increasing the quantity of coal per fall was accomplished in several mines using loading machines by widening working places although in a few exceptions widths were reduced 2 to 4 ft. for better top condition. These mines, incidentally, ranked high in tons per man, while those that increased width, as a result of this and other measures, reported substantial efficiency increases. Where place width was increased for loading machines, the increase ranged from 2 to 6 ft.

More loading-machine operators relied on deeper cuts to raise tons per fall, with a few combining deeper cutting with increased place width. Bars were lengthened, for example, from 5½ to 7, 7½ and 8 ft.; 6 to 7, 7½, 8 and 8½ ft.; and 8 to 8½ and 9 ft. Lengthening a bar from 5½ to 8 ft., as an example, theoretically increases tons per fall (with no change in place width), 46 percent; 8 to 9 ft., 13 percent. One operation tried a 10½-ft. bar but found bugdusting difficult and now is waiting for bugdusting equipment to be manufactured. In terms of tons per loading unit, one operation reported an increase of 20 per shift by lengthening bars from 6 to 7½ ft. An exception, however, was a reduction from 7½ to 6½ ft. because tight falls were encountered.

Similar increases in bar length were reported by about half the "Coal-for-Victory" mines using conveyors, with one operation specifying 10 ft. on new units. Conveyor operations reported, in addition, several increases in place width (26 to 30 ft., 24 to 28 ft., 30 to 45 ft., etc., in addition to those normally working very wide places, such as 75 ft. with room and face units in places 500 ft. deep. To accommodate wider places, some operators also took such steps as installing face sections driven by bellcranks in increasing to 40 ft. As in loader operation, a few conveyor properties took the opposite tack and reduced place width.

The stepped face was adopted by a number of conveyor operators to prevent complete interruption of loading at the end of the cycle and also to increase place width. Under this plan, 20 ft. of the face in a 50-ft.-wide room, for example, is kept one cut ahead of the other 30 ft. Thus, loading is carried on at all times. The accompanying illustration shows stepped-face operation at another property where forepoling is employed against a very bad top. The forepoles are moved ahead each cut.

Advance and retreat in a room is the practice at another mine using chain units. The plan is shown in the accompanying illustration. Using a face conveyor, a face 40 ft. wide is advanced 300 ft. Then a face 35 ft. long is established on the opposite side and mined back to the stump, leaving a 5-ft. finder against the previous place.

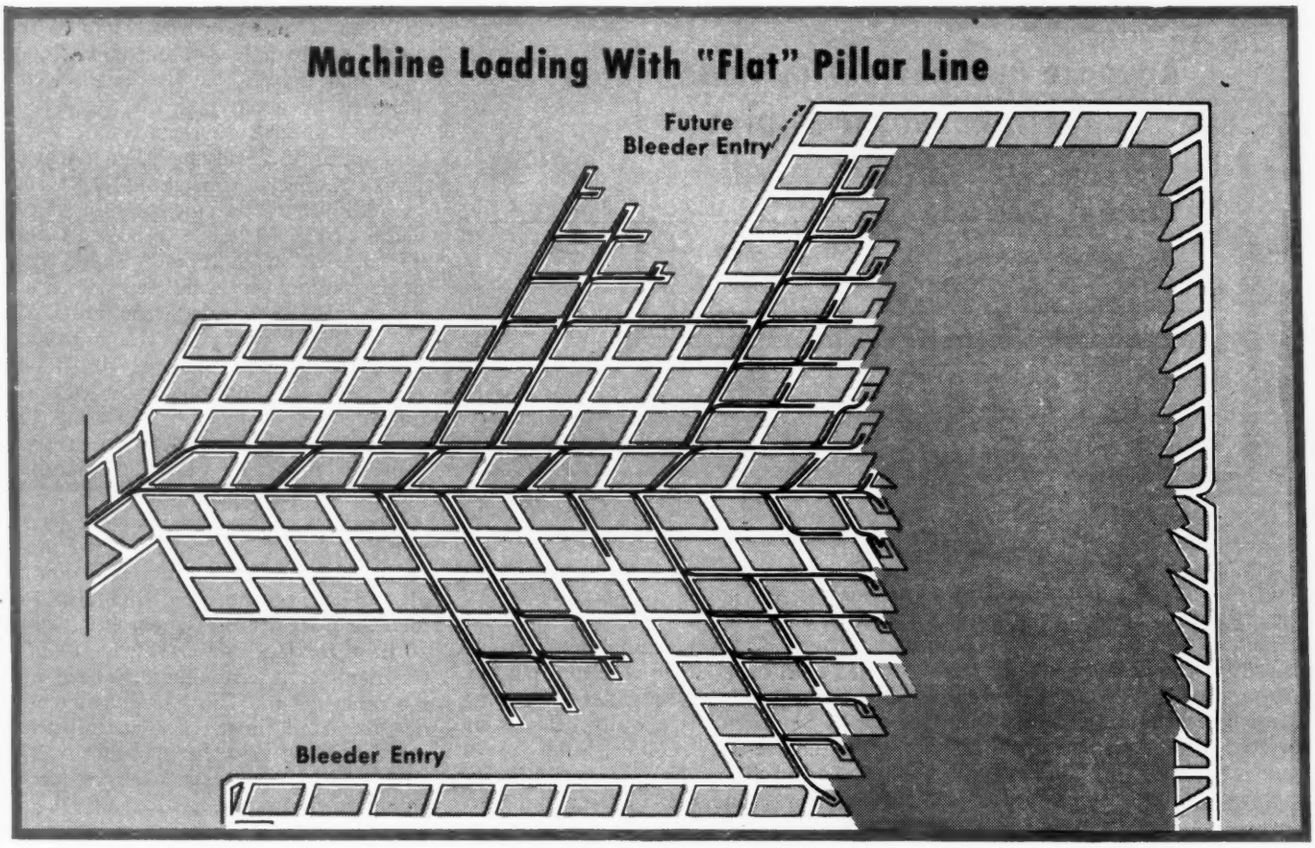
High-Tonnage Mining Plans

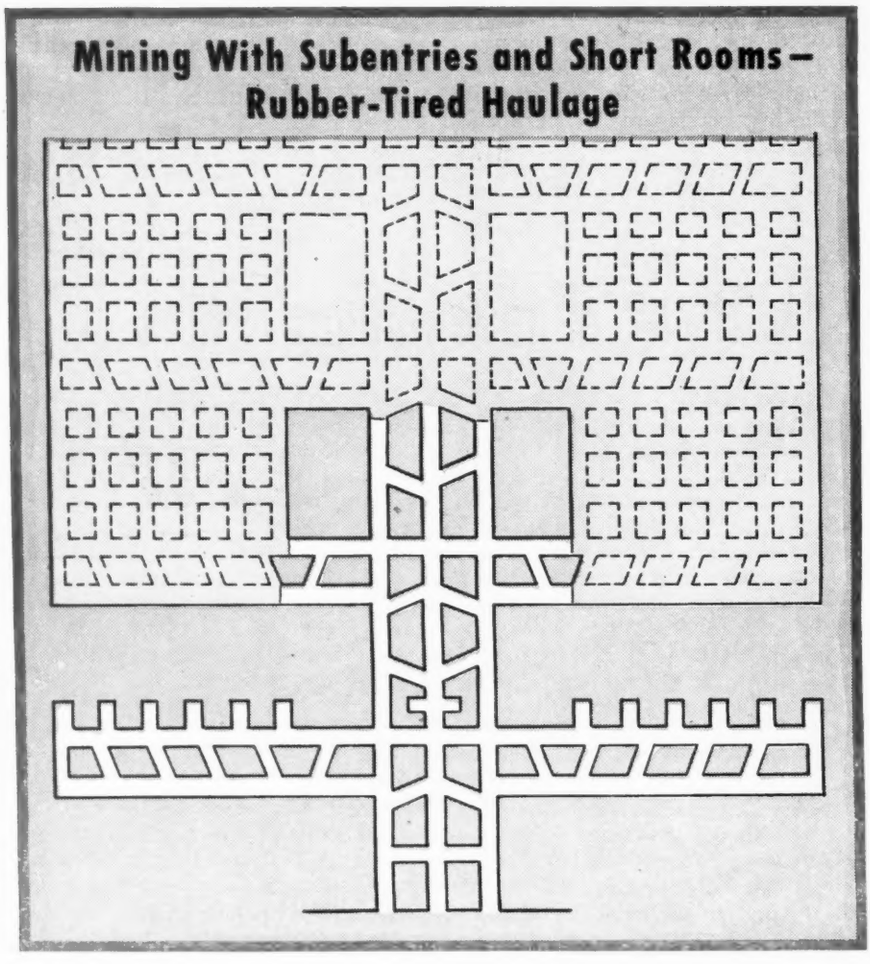
Working plans providing maximum ease of access to coal to be mined result in higher efficiency.

Since "Coal-for-Victory" mines operate in every region of the country, it is natural that they should employ a variety of mining plans. In general, they can be divided into two major classes, according to whether pillars are mined or left. Where pillars are mined, they are of the conventional rectangular type (longer than thick), square or diamond-shaped, the latter frequently attending the installation of track-mounted loading units for greater case in haulage. Where pillars are left, tons per man tends to run somewhat higher, although in many cases the thickness is greater and the top is better or coal can be left. However, leaving pillars is not an invariable assurance of higher efficiency.

One operation leaving pillars increases extraction by necking 22 ft. wide and then widening progressively, finally aiming for complete removal. Thus, width is 28 ft. for the first 50, 30 ft. for the next 100, 33 to 36 ft. for the next 200 and then, for the last 50 ft., as nearly complete removal as possible. Another mine drives sub-entries right and left from panel openings, starting at the inside. Short, wide rooms with thin pillars than are worked out in a comparatively short time, after which the units drop back and start other groups, driving through the solid coal toward the places already worked out. Thus, subpanels are mined before the top can give trouble and new work always is in solid coal and thus is protected from squeezing or other trouble in places already mined.

Another plan based on this latter

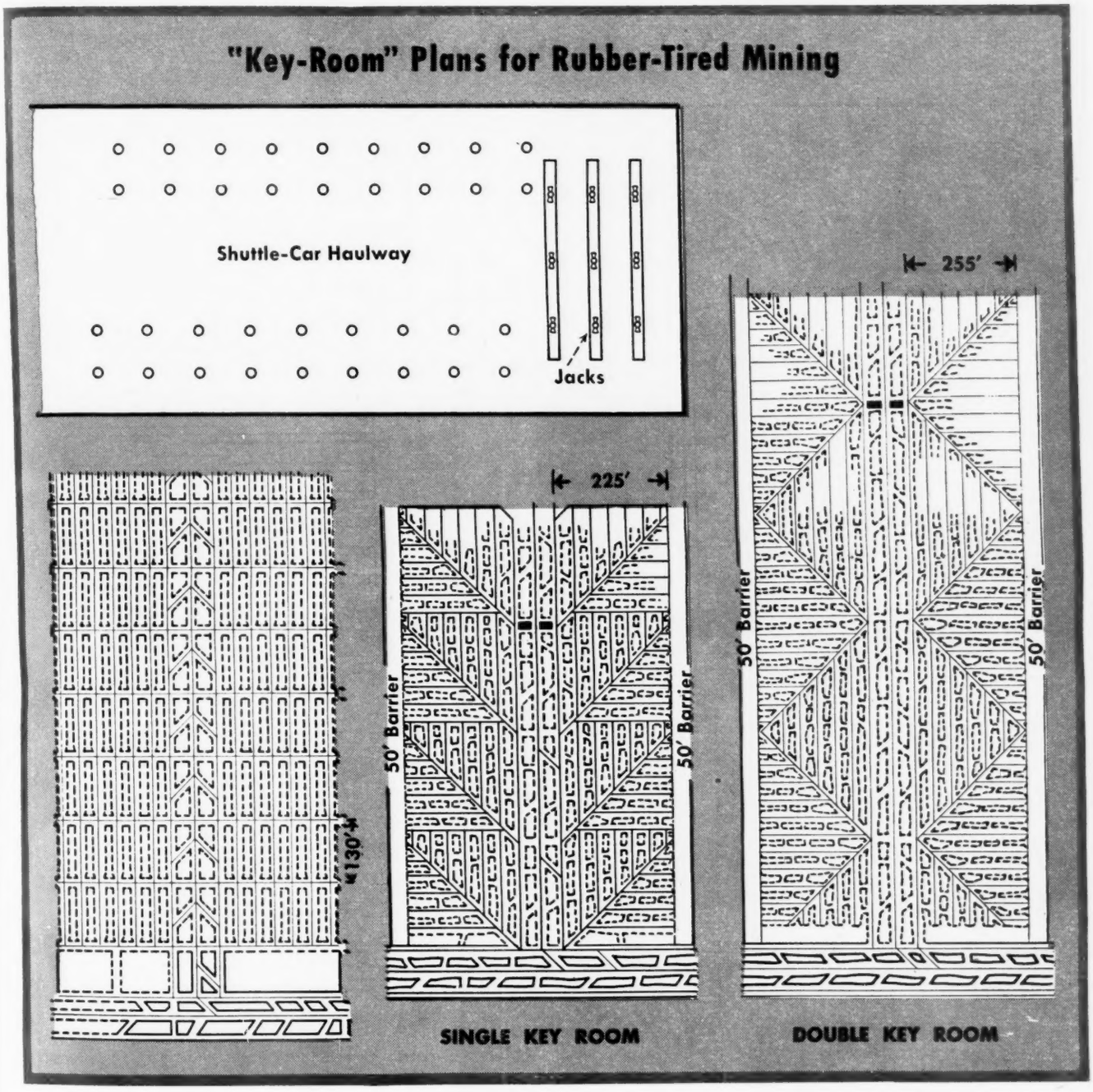




principle is shown in the accompanying illustration. As a further feature, a heavy pillar is left on each side of the entry. Loaders are served by rubber-tired haulage units.

Two of the mines working rooms only offers unusual "key-room" plans. Rubber-tired haulage is employed at these properties. In one case, a section is started with three panel headings. Then six rooms parallel to the entry are started on each side and are driven along with the entries. In effect, after the panel is opened, it is converted into rooms that are continued to the limit of the section. This plan is shown in an accompanying illustration, which also shows two other "key-room" plans providing diagonal hauls and relatively short places in systems designed to convert panels to room operation as soon as they are opened.

Where pillars are taken, the standard for many years has been an angle pillar line. At least two "Coal-for-Victory" mines, however, use the "flat" pillar line, as shown in the accompanying illustration. At the operation where this plan was developed, it is given a major share of the credit for increasing tons per machine shift (mine-car weights) from less than 250 in 1939 to over 375 in 1944 and over 400 in 1945. Eight places in developing the entry permit high unit tonnage, and starting and finishing the line "flat" means that



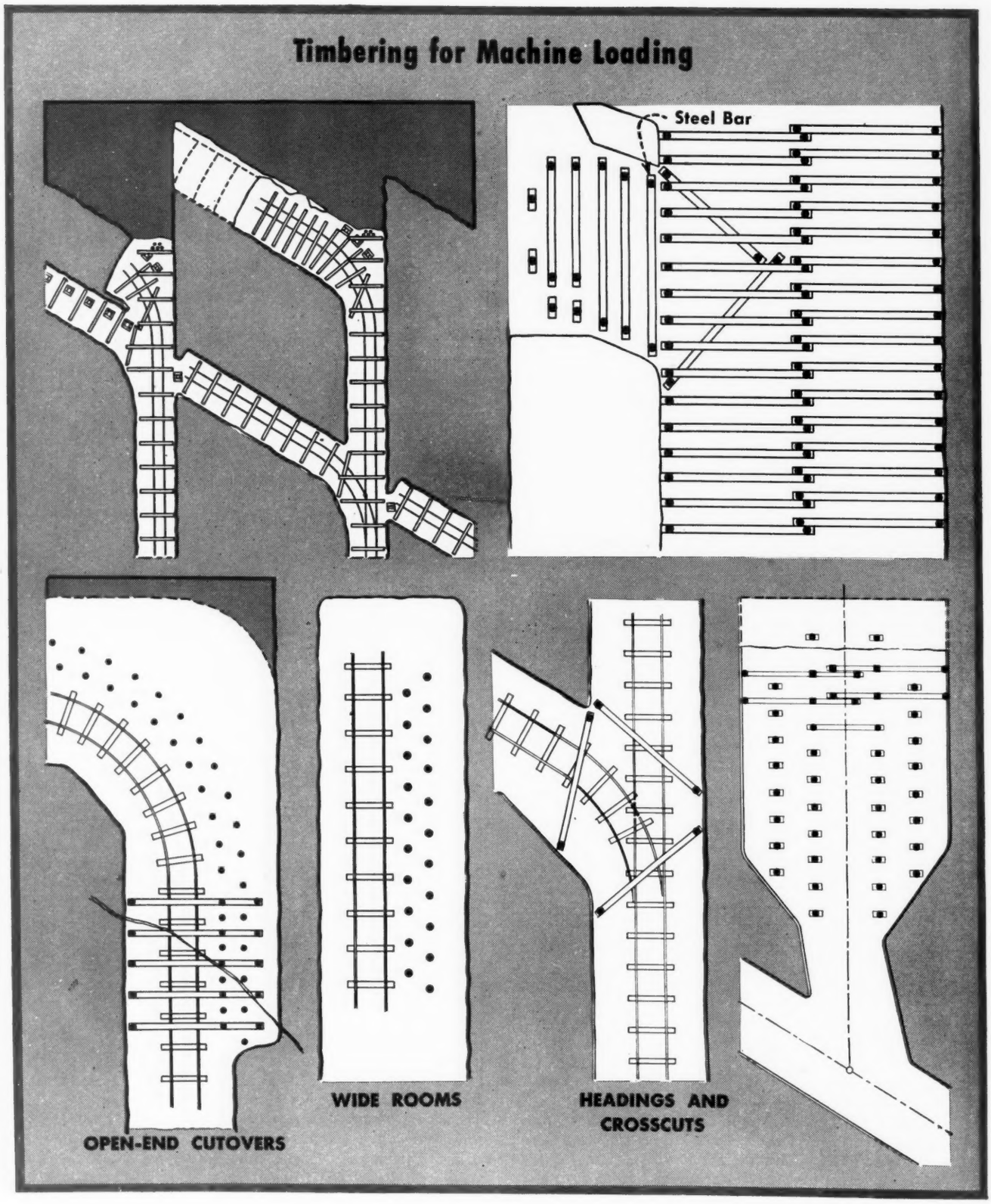
tonnage remains high from the first day to the last.

Pillar extraction and timbering at this operation are shown in the accompanying group of timbering plans. As might be expected, timbering is a major problem in a number of "Coal-for-Victory" mines. One, in fact, gives the timbering plan major credit for the results attained with loaders and rubber-tired haulage. With a wide place, bars are lapped on a row of posts in the center, making two travelways throughout the length of the room. Jacks are used for temporary support at the face. In pocketing through pillars, both long and short bars and jacks are employed.

Posting and barring under clay veins, in open-end cutovers and at turns at another operation is the subject of another accompanying group of plans. Posts with temporary bars at the face, as employed at a fourth mine, are shown in another sketch in the timbering-plan group.

Conveyor mining plans used by "Coal-for-Victory" mines generally conform to conventional patterns. While rooms are worked as the entry is advanced or on one side on the advance and on the other on the retreat, with or without pillar extraction, normal practice is to complete entry driving and then mine on the retreat. Where the coal pitches and occasionally elsewhere, rooms are turned one way only, and in a few instances, where grades are a factor, places on one side are turned at 90 deg. and on the other at 60 deg. or other appropriate angle.

Some mines follow a plan of splitting up the room units and assigning each a territory. One such plan is shown in an accompanying illustration. In 50-in. coal, output per man-shift was 9.7 tons in 1945. Track is used for developing, moving in and recovering supplies. While the belt is in, the track is split, one rail being thrown to one side and other to the other. Six conveyors, each in its own territory, start and finish

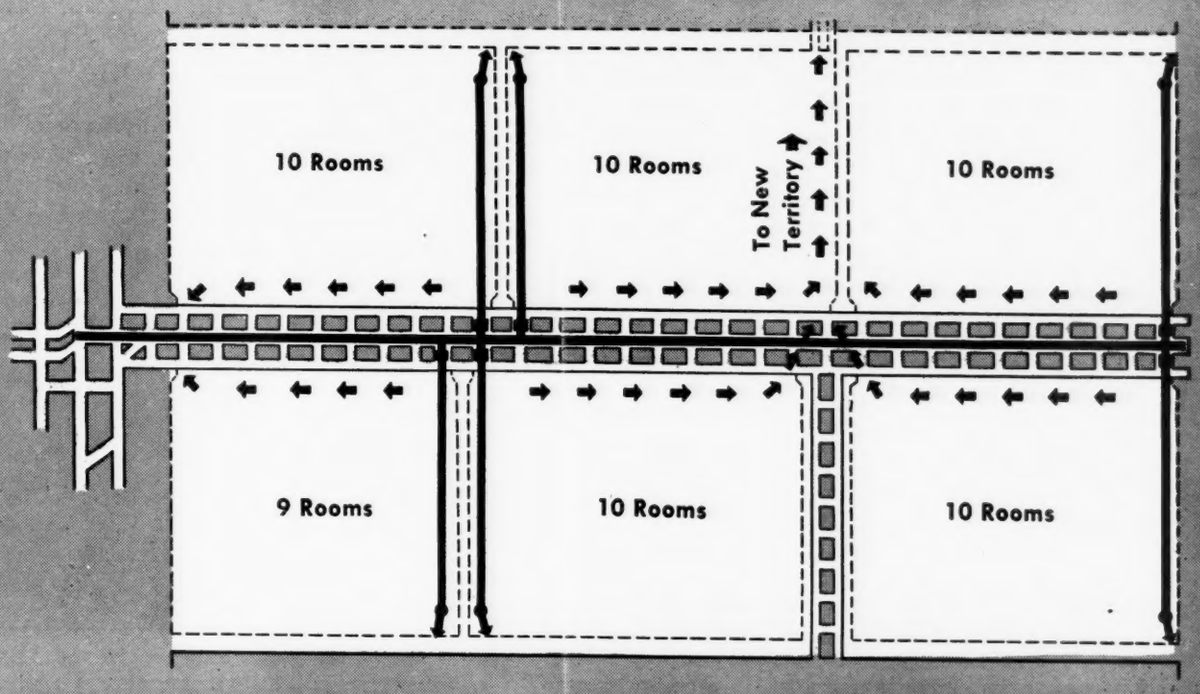


as indicated. The two outby units are moved out through the mouth of the panel. The other four are moved through No. 20 room to the next territory through two narrow subheadings driven for that purpose during development. Rooms 29 and 30 are timbered heavily for use as airways in later mining.

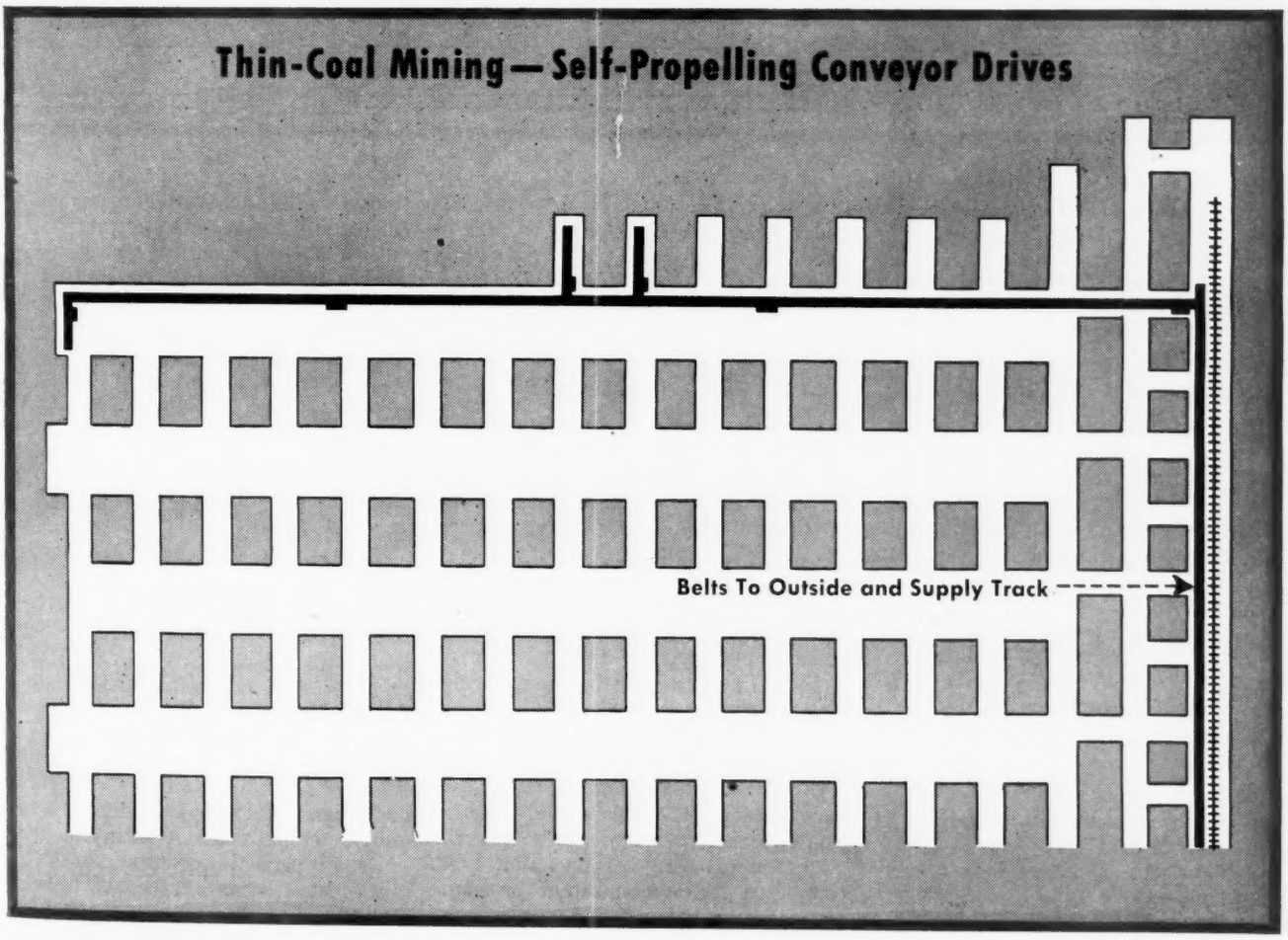
Making conveyor drives self-propelling is among the reasons for an output of over 12 tons per man at a property in 42-in. coal. Main haulage is by belts and "room work" is continuous, using several conveyors in tandem as a gathering unit and working crosscuts with face units as shown in the accompanying diagrammatic sketch of the mining plan. The main-line belts are paralleled by a supply and man track.

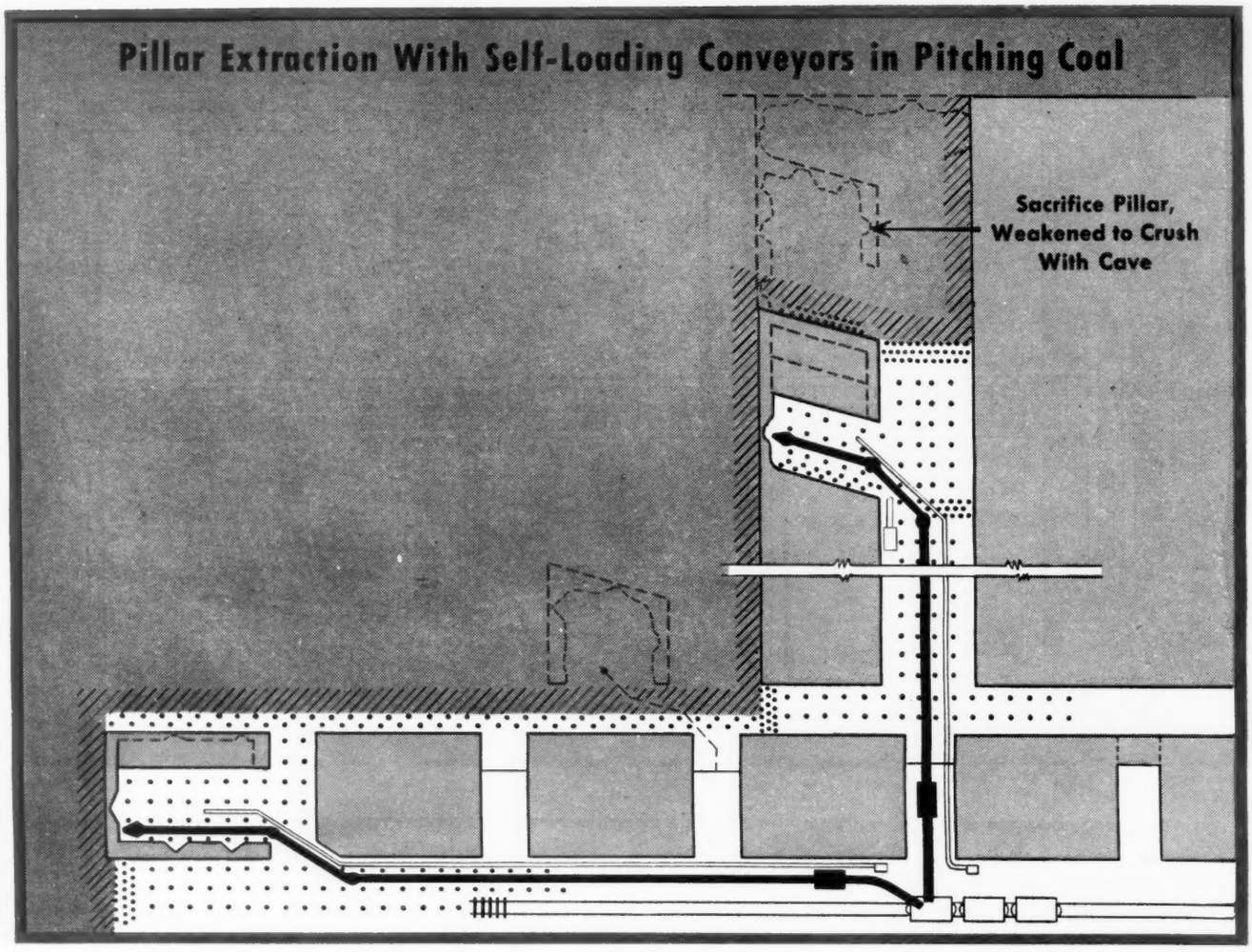
Pillar recovery in pitching work with self-loading conveyors is shown in an-

Mining and Moving With Self-Loading Conveyors



Thin-Coal Mining—Self-Propelling Conveyor Drives





other illustration in this section. This recovery also includes the chain pillars and the illustration shows the timbering plan employed. Additional protection is gained by fenders, or "sacrifice pillars," which are weakened to permit them to crush and let the roof break normally.

Better Haulage—Better Loading

Haulage behind mechanical-loading units is a major factor in productivity. Increasing its capacity and making it as nearly continuous as possible leads to higher tons per machine and per man.

One of the earliest discoveries in connection with machine loading was that getting the coal away was the critical factor. It remains the big problem even today. "Coal-for-Victory" mines generally follow the accepted methods of raising efficiency in this direction. These include:

1. Big mine cars.
2. Reduced changing distance.
3. Rubber-tired haulage.
4. Conveyors alone or with rubber-tired haulage.
5. Car and trip-spotting hoists.

"Coal-for-Victory" mines operating loading machines and employing cars with capacities of less than 5 tons are in the minority and normally are recovering the thinner seams. A substantial number of properties have had cars as big as 10 tons for several years and a number changed from smaller to larger equipment during the war.

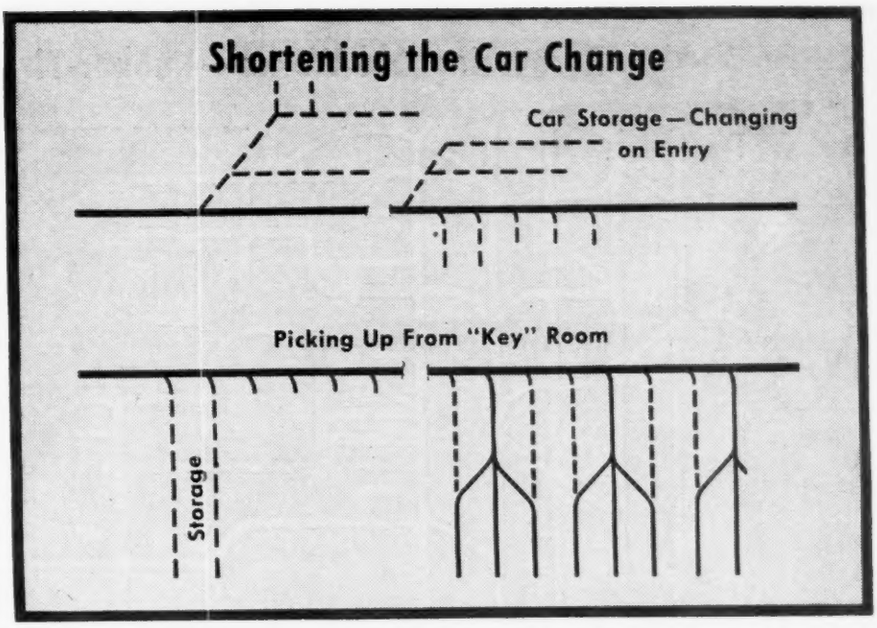
In addition to new, big cars already installed, operations planning such a step include one that will change from a 2½- to a 4-ton steel car designed for eventual rotary-dump use by welding the endgates shut. One advantage, in addition to higher efficiency, will be a much cleaner mine. Another operation that completed its modernization program by replacing 1½-ton wood with 5-ton steel drop-bottom units and a 450-ton storage hopper reported release of 14 outside men for other duties and a 56½-percent increase in the output of loading crews. Shuttle cars also are used at this mine and substitution of a trip-spotting hoist at the end of the emtpy track permitted a reduction of one man in crew size. Where track is used, the standards are 40-lb. rail, No. 2½ turnouts and home-made composite steel-and-wood ties (everything made at the mine but the two clips, which are purchased outside).

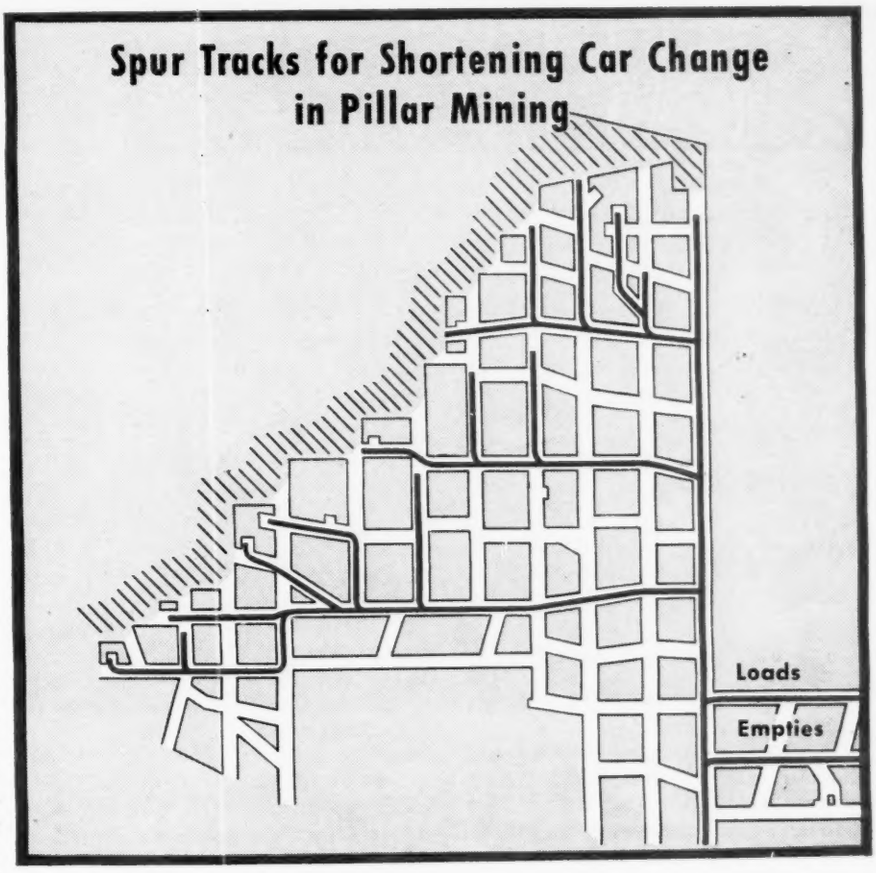
Six-ton cars instead of 2-ton units were in large part responsible for increasing tons per man from 8.5 in 1943 to 11.0 in 1945 at a mine in 96-in. coal. This operation employs the "key-room" system to keep average changing distance under 200 ft. Installation of 5-ton cars, replacing 2-ton equipment, was responsible for an immediate increase of 100 tons in output at another operation. The 8-ton gathering locomotives employed were changed from series to parallel operation to get a much-higher average speed. To keep changing distance down, one room on

each side of a "key" room is picked up by switches 135 ft. in, as indicated in the accompanying illustration, which also shows the system in entry driving. Three-part sectional turnouts are employed and are laid in half the time required for regular steel-tie types.

Ten-ton eight-wheeled cars with automatic couplers, increasingly used on new cars, according to reports from "Coal-for-Victory" mines, replaced 4- and 5-ton cars at two other properties. In one case, the increase in efficiency was 15 percent. The "key-room" system with steel-tie turnouts is employed to cut changing time. One operation also added two new 8-ton locomotives, which serve the loaders with three and four cars.

Along with other new gathering-locomotive installations, some on a wholesale scale and usually involving going from 6- to 8-ton equipment, changes were made in existing equipment for more efficient operation at several properties. In one case, top reels were installed for faster operation and lower cable maintenance. Steel and composite ties are used at the face. Spur tracks in every crosscut provide a changing point every 75 ft.





Changing With Spurs

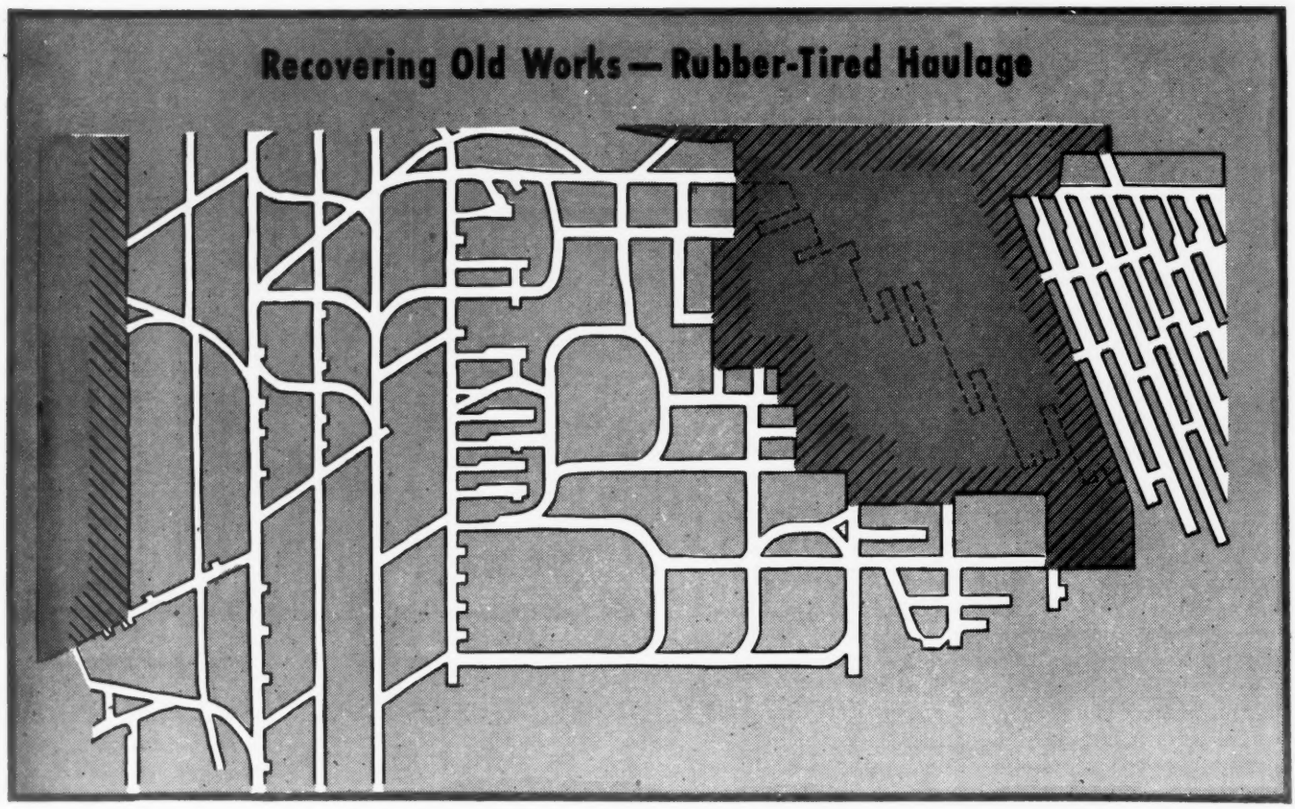
Spur tracks also are employed at a number of other mines, particularly where pillars are mined. The system at one property is shown in an accompanying illustration and includes storage tracks close by. Old 2½-ton cars are being replaced by 5-ton units, which are reported to have raised output per loading unit 40 tons per shift.

Mines that have cut working places to two, as noted earlier in this section, have made part of their records by maintaining minimum changing distance.

Conveyor service to loaders was employed by several "Coal-for-Victory" mines. Details on some were given earlier in this and in the preceding sections. A substantial number of winners have gone to shuttle cars. Several have accompanied them by belts. In four instances, with coal thickness running 54 in. and up, tons per man-shift ranged from 9 to over 12 in 1945. Shuttle cars (2½ to 10 tons) discharging to mine cars are used in seams down to 50 in. at "Coal-for-Victory" mines. Tons per man-shift in 1945 varied from 4.45 to 13.20 at these properties with the majority ranging from 7 to 10 tons. Mine-car capacities vary from 2.4 to 4½ tons.

In addition to regular work in virgin acreage, shuttle cars also are employed in completing old works and recovering pillars. An example is given in an accompanying illustration. For trip service to the elevating conveyor, circle haulways are established.

Both battery and cable-reel cars are employed, with some operators asking for hydraulically controlled discharge elevators on new units to permit them to feed directly to mine cars. Battery units are preferred by some because of increased flexibility, while others like cable-reel equipment because they feel it is cheaper to operate. Several operators use both. One is ordering new cable-reel cars with both right- and left-hand four-wheel steering in addition to four-wheel drive. With two serving a loading machine, one will use one



side of the heading and the other the other, putting the cables on opposite sides of the opening and reducing interference.

Elevators are commonly employed for transferring the coal to mine cars. Where belts are installed, ramps are common. In one case, the operator uses chain conveyors to receive the coal and relay it to the belts. Ramps also are employed to feed to cars, but one operator reports that in comparison elevators materially reduce shuttle-car discharge time. Roads normally offer no major difficulties, but in one case, because water admitted through surface breaks in pillar mining caused softening of the fireclay, the operator changed from cutting in the coal, leaving about 2 in. down, to cutting in the 5- to 8-in. bone under the seam.

Number of cars per loading unit normally is two. In a few instances, however, one is employed. At one operation in 54-in. coal, use of one car instead of two was found to raise tons per man-shift materially. Over-all tons per man at this property was 7.70 in 1945, compared to 6.92 in 1943.

Moving of units has received considerable study at some rubber-tired-haulage properties. At one, the move is made in one shift, including setting up the elevator, mounting the trip-spotting hoist, installing the battery chargers, etc., and the unit is ready for production to start the next morning in the new section. This speed was made possible by forming a special moving crew of one foreman and three men. An essential item is getting ready in the new territory, which is checked in advance by both the moving and unit foremen. During the war, five and six men were employed in moving and frequently they failed to complete the job in the allotted time.

The majority of the room conveyors at "Coal-for-Victory" mines, as previously indicated, are served by gathering or mother-belt conveyors. Regardless of whether room units go directly to cars or to gathering equipment, however, it is almost universal practice to employ car- and trip-spotting hoists. One exception is the use of a friction brake. Another property expects to replace large trip-moving hoists with barneys. At another mine, the trips are moved by the locomotive that brings them in. In moving at this operation, incidentally, conveyors are shifted as outlined in the plan and description appearing on p. 107. When a territory is completed, all the men on the 6-room unit tear out the equipment and move it 700 ft. to the next panel. Then, in two more shifts it is set up again ready to go. Total man-shifts required is 120.

An unusual haulage schedule is employed in connection with hoists at the conveyor discharges at one mine. Total track haulage to the outside is about one mile and three locomotives and six men formerly were employed. Now, two locomotives and four men are standard with the locomotives working together. One takes the front of each trip and the other the rear. Thus, there are no delays through one trip waiting for another, no dispatching and no chance of collision. Also the men never have to walk to open doors or throw switches. In changing a trip at a conveyor head, the front locomotive cuts off and runs in against the loads. The rear unit then shoves the empties through a switch onto a changing track to let the loads out, then switches the empties under the conveyor and couples to the rear of the loads.

Car capacity, as might be expected, is on the smallish side at conveyor operations. However, several properties run to capacities of 4 to 5 tons and have replaced old equipment to get the other advantages of modern design. Composite cars with copper-bearing sides and ends and anti-friction bearings (2 and 2½ tons capacity) replaced 1.3- and 1.6-ton units at two properties. Coal handled per trip was increased (one mine reduced number of trips per shift by four), derailments and other delays were cut and maintenance was materially reduced. Another operation replacing 2½- with 4-ton equipment reported that this step increased production from conveyors by making for faster haulage and reducing delays.

FACE PREPARATION For Better Loading

New cutters installed at "Coal-for-Victory" mines included, in addition to other high-capacity equipment, reduced-horsepower units at some conveyor operations keeping a cutter in each place. Installation of new high-capacity equipment included new arcwalls at two hand-loading operations. These cut faster, tram faster, conserve on labor and generally promote efficiency. Another hand-loading operation in 48-in. coal employs top cutters because the rolling nature of the seam makes bottom cutting difficult.

New installations at mechanical-loading mines included high-capacity shortwalls with hydraulic controls in addition to the bugdusters already noted. They also included track-, crawler- and rubber-tired cutting-and-shearing units, normally with 9- to 10-ft. bars. One operator replacing shortwall units with track-type universal machines with 9-ft. bars reports that in spite of the addition of a shear the machines average four more places per shift. Since bars are 2 ft. longer, each cut also yields 25 to 30 percent more coal. Roof control is improved, timbering is saved, and safer conditions prevail.

Trends in drill application paralleled those in cutter installation. In other words, heavier, higher-capacity units were increasingly employed. No change in type was involved in some instances. In others, operators changed from hand-held to post and from post to mounted, or from hand to mounted. Experimentation also produced such developments as mounting the drill on

LOADER performance, not to mention maintenance, is affected by many things. Not the least of these is face preparation—cutting, drilling, shooting and handling drawslate and partings. Face preparation is a combination of equipment, materials and methods—type and capacity of equipment, type and handling of bits, type and application of coal-breaking mediums and methods of handling waste material. "Coal-for-Victory" mines, as might be expected, offer numerous examples of practices now accepted as modern and leading to higher efficiency.

CAPACITY FOR PRODUCTION

For maximum production and highest efficiency, modern loading equipment requires cutting and drilling equipment matching it in capacity.

Getting higher capacity in cutting can be accomplished by installation of new equipment with an increased rating or by increasing bar length and feed speed of existing equipment. The latter step, as noted in preceding sections in this issue, has been taken by many "Coal-for-Victory" operators. Few of those employing loading machines use bars less than 7 ft. in length and in most cases lengths are 8 and 9 ft. In one instance, the increase was from 5½ to 8 ft., meaning, theoretically, a 47-percent increase in tons produced per cut with no increase in labor. One operator tried a 10½-ft. bar on shortwalls but found bugdusting difficult. Consequently, use is being held in abeyance until bugdusting equipment is delivered. Several others have found bugdusters highly satisfactory and additional operators are specifying them on new equipment.

Longer bars also have been adopted at a number of conveyor and hand-loading operations, one operator, as an example, going from 6 to 9½ ft. In contrast, there were one or two instances of reductions. At one mine in 40-in. coal, length was dropped from 9 to 6½ to 7 ft. because the machines were easier to handle. In another, using loading machines, length was cut from 7½ to 6 ft. because tight falls were encountered with the deeper cuts.

GETTING EFFICIENT FACE PREPARATION

1. High-capacity cutters with modern auxiliaries.
2. High-capacity drills.
3. Longer cutter bars.
4. Use of modern bits with long point life to reduce changing time.
5. Good cutting and bugdusting.
6. Investigation to get proper drilling pattern.
7. Investigation to get proper breaking medium.
8. Good support to prevent top trouble during and after loading.
9. Mechanical handling of top and parting material.
10. Full-seam and combination coal-and-slate loading.

a small gathering locomotive, saving one man a shift. Another operator was equipping his track drills with a hydraulic swing for the booms, converting them from two- to one-man units. Clutches were being increasingly installed on hand-held equipment for greater safety in operation, some mines having standardized completely on such equipment.

BITS FOR LOW COST

Since cutter or drill power can be applied only through the bits, correct choice is vital for highest efficiency.

Steps taken by "Coal-for-Victory" mines to improve cutting and drilling performance through better bits include:

1. Tipping, hard-surfacing or heat-treating.
2. Use of special alloy steels.
3. Use of alloy-insert types.

Results include reduced transportation, reduced labor for sharpening, increased production between bit changes, reduced power demand and consumption, lower machine maintenance and coarser cuttings. Alloy-type "throwaway" bits were employed by numerous "Coal-for-Victory" operators, with an approximately equal number tipping or hard-surfacing standard bits. Results in tons cut per point were two to six times that cut by plain bits. Drills were almost universally equipped with heads accommodating cutting bits of the alloy "throwaway" type.

Several mines also are trying or going to the new alloy-insert tip for cutter and drill bits. Results reported for this issue include an increase of from one to 75 places cut per set in one case; one to 50 places (hard cutting) in another, etc., with corresponding results on drills, plus, according to some users, faster drilling.

BREAKING COAL EFFICIENTLY

Right drilling pattern and proper breaking medium cut breaking cost and increase coal "loadability."

Getting good coal breaking is primarily a matter of close study of conditions at individual properties, although a few basic principles apply in the majority of cases. These include good cutting with straight ribs, no drilling on the solid, thorough bugdusting and holes spotted to equalize the burden and permit one to clear the way for the other. Shearing, by providing an additional free face, normally improves loadability and coarse-coal percentage with fewer holes and reduced charges. One operation that changed from bottom cutting with 7-ft. bars to top cutting and side shearing with 9-ft. bars, leaving 18 in. of top coal in a 96-in. seam, found it possible to reduce from 5 holes and 16 sticks of powder in 14-ft.-wide places to two holes and twelve sticks.

Careful study of hole placement and powder charges was given as the major source of improvements at a number of operations. Several employed snubbing holes to break bands or break down and throw out the lower part of the seam and thus relieve top holes. Band-breaking snub shots also were employed in the top. An example is shown in an accompanying illustration. A thin slate parting comes in 15 in. from the top in some sections of the mine, and where it is encountered, the two holes, one on each rib, are supplemented by a third hole in the center. Prior to adoption of the present plan, drilling was haphazard and the tendency was to put holes too close to the ribs. Now, holes are drilled 18 in. away and angled up to the top as indicated and this standard is enforced. Under the old system, as many as four holes were drilled. Now, the number is never more than three.

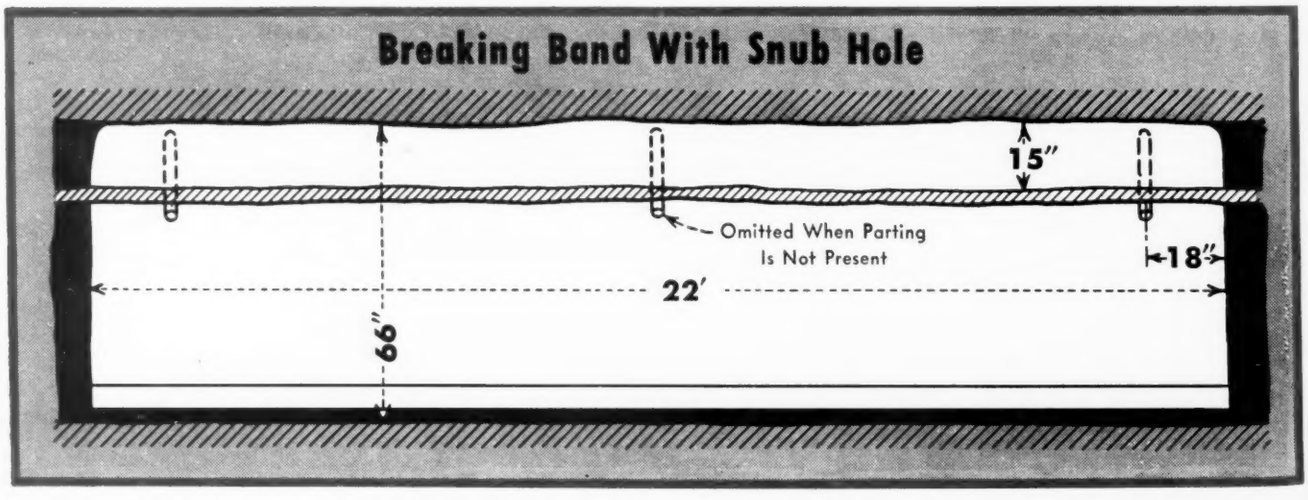
Another operation standardized, after investigation, on drilling holes straight in near the roof instead of angling them up. These and other minor changes (42-in. coal, 9-ft. bars) permitted reducing powder charges from three to two sticks in the five holes employed. Results also included more lump and a cleaner face. In another operation in 36-in. coal, similar methods made it possible to cut sticks per hole from 2½ to 2.

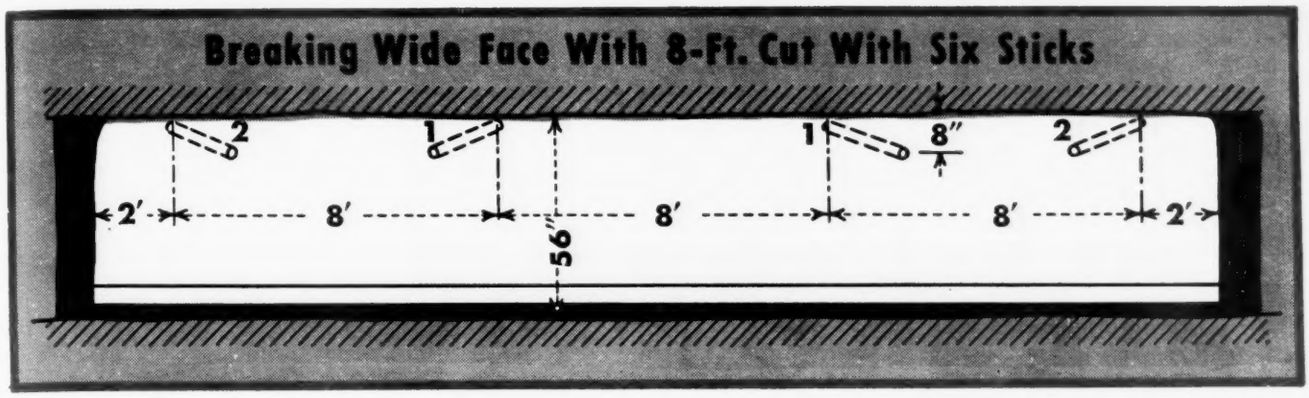
As a further example of the benefits of study and greater care in drilling and shooting, one mine in 54-in. coal reported that stricter supervision over hole placement, charging and other shooting practices, plus a change to a slower powder, raised coarse-coal output 3½ percentage points since November, 1944.

Additional evidence that study of the question can result in good breaking with very small powder consumption is provided by the plan employed at a conveyor operation in 56-in. coal (see accompanying illustration). Under this plan, the cut is short with five sticks: two in each rib hole and one each in the middle holes.

Breaking mediums at "Coal-for-Victory" mines included permissible powder, carbon dioxide and air. The latter is used in a number of operations where legislation prohibits employment of any other breaking medium on the shift. Number of holes must be considerably increased (one mine uses 24 to 32 in a 28-ft. place in 78-in. coal), raising the cost but providing an increased yield of coarse coal. Screenings production was reduced approximately 10 percentage points at this operation.

While carbon dioxide was found less suitable at two operations reporting for this issue—in one case because of bands in the coal—it was in regular use at a number of others and has been adopted recently at still others. One that





made the change in January, 1946, although still using powder in heavily timbered places with bad roof, reports a carbon-dioxide cost of 8.79c. per ton against 11.06c. with powder. Better loadability is obtained, the operator states, if the holes are spaced correctly and a sufficient number of tubes are used to break up big chunks. Seam thickness ranges from 45 to 144 in. and production of 3-in. lump is reported as 52.42 percent with carbon dioxide and 30.92 with powder; 3x1½-in. nut, 12.93 and 15.52; 1½-in. screenings, 34.61 with carbon dioxide and 53.58 with powder.

Changes in breaking mediums also involved revisions in both stick size and types for more satisfactory results and lower cost. One property in 84-in. coal using 7½-ft. bars changed from 1½x7 to 1½x8 permissible, which brought the coal down better and permitted reducing sticks per hole from four to three. Another, in the same thickness of coal but using 9-ft. bars, went from 1¼ to 1⅜ in. to get better breaking at the back of the cut. Some users of carbon dioxide also changed to larger tubes to get a freer fall and better rolling out of the coal for easier loading.

HANDLING TOP AND PARTINGS

Positive holding of top material promotes safe, efficient operation where this is the practice. If taken down, or if partings must be handled, mechanical methods cut cost.

Where drawslate or other top material is concerned, "Coal-for-Victory" operations fall largely into two classes:

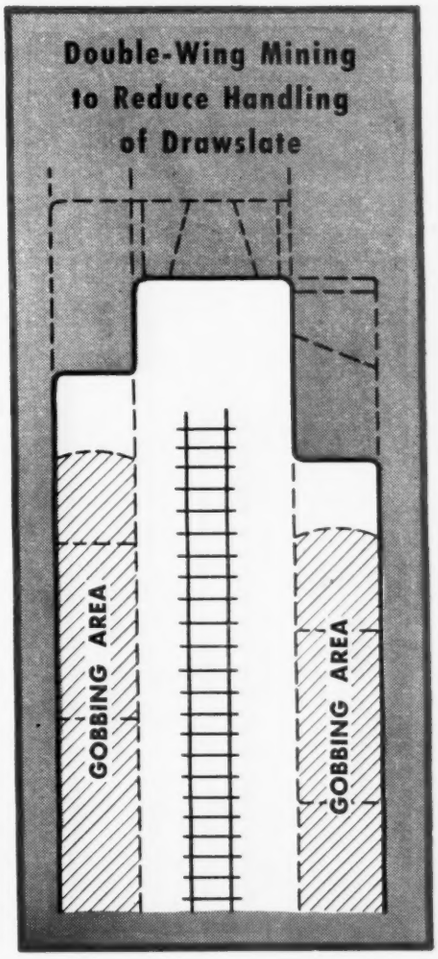
1. Mines holding the slate either temporarily or throughout place life.

2. Mines that drop it with the coal and load everything out together. Usually, these operations are equipped with mechanical cleaning units. The number following this practice is increasing.

Partings apparently do not constitute quite the problem of top material, but the trends in handling are substantially the same where loading machines are employed. In hand loading into cars and conveyors, however, customary practice is to pick out and gob as much as possible in rooms. In headings, however, lack of gobbing space usually forces separate loading. At one operation, practice, in line with the preceding observations, varies with the type of equipment employed and whether the coal goes to the central mechanical cleaning plant or to the local tipple with picking tables. The parting varies from 0 to 22 in. and in heavy-thickness areas where the coal is delivered to the mechanical cleaner, everything is shot and loaded together by loading machines and self-loading conveyors. Where the coal goes to the tipple, the parting is cut out and loaded separately into cars after as much as possible—usually small—is gobbed inside. In general, coal from sections with no parting also is delivered to the local tipple.

While the tendency, as stated, is toward loading out partings, particularly where loading machines and mechanical cleaners are installed—and to a considerable extent with conveyors and tipples also—"Coal-for-Victory" mines offer a few instances of bench mining. In one case, the thin gas coal over a slate parting is first pulled out and the slate skinned off before the rest of the cut is loaded. In another, the coal under a 3- to 6-in. middleman is loaded and then the middleman is barred down and gobbed. Hand loading is the rule in both instances.

Coal is left in some operations to simplify the drawslate question, although support with permanent and temporary bars and posts still is the rule. Where all the coal is taken, operators usually are left with a top condition varying from fair to very bad. A number, as indicated, depend on support to keep the top up and thus avoid handling it. In the face zone, this presents a real problem at times, which usually is solved by the use of temporary bars, posts and jacks; frequently the latter. Jacks are employed because they are faster and some operators have gone further to get quick-acting types. Wood is the customary bar material. If bars are not used in regular room support, frequent practice is to keep several in place in the loading zone to protect men and equipment. Some operators employ steel bars for both permanent and temporary service, especially where the spans are great. At least one uses a 4-in. aluminum H for temporary support at the face because it is lighter and easier to move around. Forepoling is practiced by at least one operator, this and other timbering plans being shown in



illustrations in the preceding section.

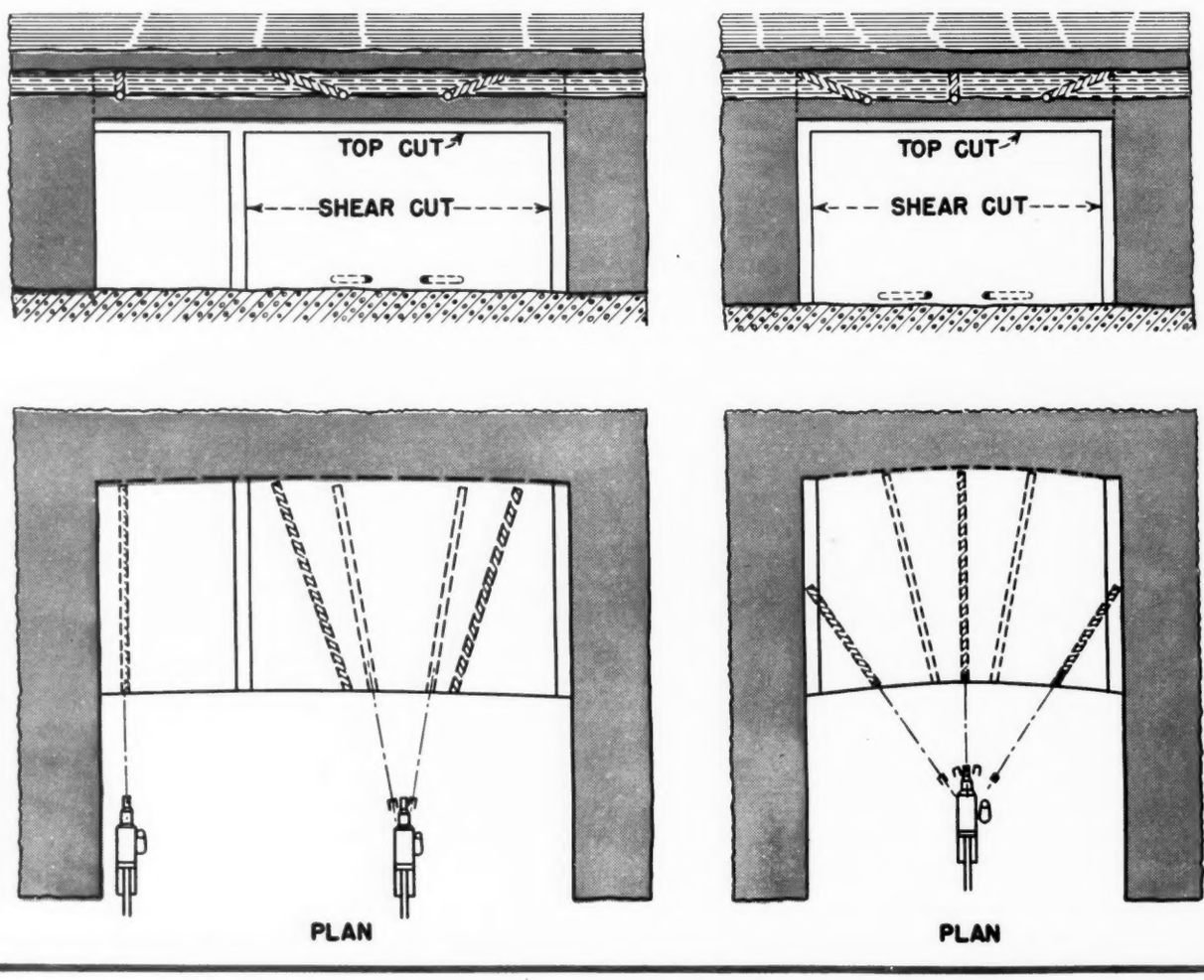
Where the slate is not held permanently, usual practice is to keep it up by posts, jacks and bars until the cut is loaded and then drop it for disposal either by gobbing or loading. In the latter operation, the trend is toward handling it by the loader or conveyor. Belt transportation is a complicating factor, but in one case an average of 12 in. of drawslate is barred down after the coal is taken out and then placed in shuttle cars by the loaders. In dumping onto the belts, a clear space is picked for the slate and men at the heads of secondary belts control them to put slate on empty stretches on the main units. At the tipple, a flygate in the discharge chute permits diverting the slate to the dump.

In some instances, part of the cut is loaded and then the slate is thrown back by the loader, after which the remainder of the cut is taken. Slate men then come in for the final clean-up. In others, all dropping of the slate and gobbing is done by hand after the machine leaves. To reduce the quantity to be handled, one mine employs the "double-wing" system shown in the accompanying illustration. With this system, only the slate in the face needs handling, that on the sides being left alone. Two rows of gob posts 3½ ft. apart, with posts on 5-ft. centers and rows staggered 2 ft. to permit gobbing, are set on each side of the clearance area. Where top coal is held, H-beams are used on both sides. A safety bar is hitched in the long wing not over 6 ft. from the place.

Taking the bull by the horns, a growing number of operators now shoot and load top material and coal together, depending upon the cleaning plant on the surface for separation. The drilling plan in one such case is shown in an accompanying illustration. Timbering is reduced, 25- to 50-percent safer conditions prevail and general efficiency is raised.

The contention that complete mechanical handling is most efficient in the long run apparently is borne out by increases in tons per man-shift—not all due to the change to full-seam mining—at these properties. One exception to the use of mechanical cleaning in full-seam mining is an operator in 70 in. of coal, using loaders and hand-loaded conveyors. In loader territories, 8 in. of drawslate is handled with the coal and is picked out in the tipple. Tons per man-shift at this operation increased from 5.76 in 1943 to 7.76 in 1945. Tons per man-shift at another in 84-in. coal went up from 6.3 in 1943 to over 7.2 in 1945. Three others in 58- to 60-in. coal and handling 12 to 14 in. of slate reported increases in tons per man-shift between 1943 and 1945 as follows: 5.26 to 7.31, 5.0 to 8.0 and 5.64 to 6.64.

Drilling Pattern Where Top Is Loaded With the Coal



TRANSPORTATION For Low-Cost Operation

HAULAGE improvements stand out among the steps taken to raise efficiency at "Coal-for-Victory" mines. They were a factor at numerous operations and at several were given the lion's share of the credit for increases in tons per man, evidencing further the effect of main-line practices on face operations. One operation, reporting an increase of from 5.09 tons per man in 1944 to 6.28 in the first eight months of 1945, stated: "The main haul road, which had gotten in very bad condition, was completely overhauled last year, and this speeded up the entire transportation system."

In addition to improvements in haulage roads, involving heavier rail, welding, treated ties, better drainage, improved roof support and the like, transportation betterments included:

1. Belt slopes.
2. Belt main lines.
3. Better locomotives and cars.
4. Better control of trip operation.
5. Cutoffs to reduce haulage distance.
6. Grading to cut down hills.

EFFICIENT COAL HOISTING

Capacity is increased and power and labor conserved by modern equipment and methods for hoisting coal.

Where drift openings are impracticable, the majority of the "Coal-for-Victory" mines reporting in this survey operate belt slopes. Some have been in service many years, with little or no trouble with the belts or other appurtenances. New slopes for belts have been sunk with loading machines. Linings include sand-cement coatings, steel timber and steel tunnel liners. In the case of one sand-cement installation, made in 1939, it has been necessary to go over it only once.

Belt sizes range from 30 to 48 in. in the slopes in operation. Usually one unit serves the mine, but in at least one instance tandem 48-in. units cover a distance of 2,400 ft. Dump hoppers normally accompany belt installation, such as one equipped with an extensible-retractible spreading and filling belt to serve a 48-in. main belt 402 ft. long on a 16½-deg. inclination. At another operation the original mine-car hoist was replaced by a 30-in. 330-f.p.m. belt 635 ft. long. Inclination of the main section is 18 deg., flattening off to 9 deg. to take coal from a new hopper on the bottom.

One property has employed a chain-and-flight conveyor for many years but is looking into the possibility of a belt replacement. Chain-type car hauls are used by several slope operators. Here, also, one is considering changing to a belt. Another has a fluid-drive car haul on hand to replace the barney feeding cars to the chain. Belts also are being considered for replacement of rope hoists. At one property it is planned to replace rope hoisting on the 10-deg. part of the slope, continuing rope use on the 500- to 700-ft. stretch of 37-deg. opening at the portal. Belts also are used for lowering in a few instances, one operator reporting that so far such a belt had lasted 18 years in such lowering service.

As with haulage roads underground, reconstruction of rope-hoist slopes can greatly improve operation. By regrading, retimbering and the use of new ties and heavier rail, one mine was able to raise capacity (10-car trips) from 19 to 33 trips per shift. One 10-percent hump was cut to five.

Making Haulage More Efficient

1. **Conveyor slopes with storage bins.**
2. **Improved car-feeding equipment for slope chains and cages.**
3. **Regrading, retimbering and heavier rail in car slopes.**
4. **Big mine cars.**
5. **Anti-friction bearings.**
6. **Automatic couplers.**
7. **Spring draft and buffing gear.**
8. **High-strength corrosion-resisting steels.**
9. **Bigger locomotives with modern controls.**
10. **Rebuilding locomotives for higher efficiency.**
11. **Tandem or double-header operation.**
12. **Dispatching, block signals and electric switchthrowers.**
13. **Belt haulage.**
14. **Truck haulage on the outside.**
15. **Heavier rail—up to 85 lb.**
16. **Welded joints.**
17. **Treated ties.**
18. **Good drainage and roadbed.**
19. **Good roof support—treated or steel timbers, hitch drilling, sand-cement coatings.**
20. **Grade reduction and cutoffs.**

SAVING WITH MODERN UNITS

Capacity, continuity, reduced power and maintenance and economy in the use of manpower are provided by modern haulage equipment.

Numerous "Coal-for-Victory" operators have improved transportation efficiency by the use of improved transportation equipment. An outstanding category is mine cars. Their effect on productivity at the face already has been discussed in preceding sections, but they also offer other advantages. Higher capacity permits reduction in number of trips in many cases, with reduction in interference and improved service to face units. Better materials (corrosion-resisting high-strength alloys) cut dead weight and reduce maintenance. Anti-friction bearings, used on by far the majority of cars at "Coal-for-Victory" mines, reduce power, cut derailments and make for smoother operation. Solid-end equipment, growing in use, also reduces maintenance and results in cleaner mines.

Automatic couplers, employed in increasing numbers, especially with the larger equipment now being installed, continue to save time and eliminate coupling injuries. Wheels also have received attention from operators seeking better metals. For example, one operator changing to rolled-steel wheels reports a substantial improvement in operation and a reduction in maintenance. Truck improvements at another property included a change from sealed-for-life bearings to a fitted type greased four times a year. Spring draft and buffing gear was another item in modern car design employed by award-winning mines.

Locomotive developments included installation of new and larger equipment and rebuilding and combining old for better performance. This was true in both relay and main-line services. Also, relay equipment was introduced at some mines where main-line equipment previously hauled directly from gathering units. In one case installation of relay units in 1944 was reported to have raised operating efficiency. Reasons included the fact that only one locomotive used a track section and thus there was less interference.

New main-line equipment installed in the past two or three years included some units rated as high as 26 to 40 tons and some with speeds up to more than 30 m.p.h. Eight- and 13-ton equipment at two mines was replaced with new 15-ton units 30 in. high and equipped with hydraulic brakes, dynamic braking and full magnetic control. Ten-tonners were replaced with 20-tonners at another property. In several other instances new equipment of 20 tons and better was called on to supplement that already in service. Planned purchases included a unit rated at 25 tons but actually about 30 tons. By making possible an increase in trip size this unit is expected to make possible haulage with one less crew.

Making single locomotives into tandems also was fairly common at "Coal-for-Victory" mines. The most frequent conversions were individual 10-tonners into 20-ton tandems. Six- and 8-tonners also were involved, along with a few units over 10 tons.

Rebuilding gave several operators a chance to modernize existing units—even to the extent of streamlining them and fitting them with ample quarters for tripriders as well as motormen. Hydraulic brakes were installed on several rebuilt units, along with anti-friction bearings. Air and dynamic equipment, along with air sanders, new-type equalizers for smoother operation and other auxiliaries, were installed. Dynamic-braking controls are energized by a 32-volt storage battery in the case of one 15-ton unit so that they may be operated at all times, even when there is no power from the trolley.

Double-heading of trips was reported by a number of mines surveyed for this issue. In such double-heading one locomotive takes the front and the other the rear. In one case trip size was doubled and the demand charge was cut $200 a month because it then became impossible for two trips to get on the major grade in the mine at the same time. In other cases double-header operation avoided the waiting, interference and danger of collision present when two units use the same track. At another mine with a 4½-mile haul a 20-ton locomotive was added to push trips headed by a 30-ton machine. Trip size of 45 cars was not changed but double-heading cut round-trip time from 60 to 45 minutes. In addition, the main-line parting was moved 1,000 ft. farther into the mine. Results included elimination of two relay units per shift and making more cars available to the sections.

Control of trip movement involves dispatchers at a fair number of award-winning mines. Many also use block signals, electric switchthrowers and switch-position indicators to make haulage more efficient and safer.

Belt transportation in both high and low coal, slope and drift operations, features a number of "Coal-for-Victory" properties. Indicating distances being covered, one such operation reported 10,000 ft. of 30-in. belt in service; another, 8,500 ft., and so on.

Haulage at several deep mines also features another type of equipment: motor trucks. One operation plans to cover the ten miles from a new operation to the tipple on the railroad with two 30-ton tractor-semi-trailer units. The round trip (60 tons) is expected to require an hour. Another operation is now using five automotive units on a 2½-mile outside haul—three 3- to 4-ton trucks and two 4- to 5-ton semi-trailers. Four 1½-ton trucks are used on another ½-mile haul at this same property.

High-Tonnage Haulageways

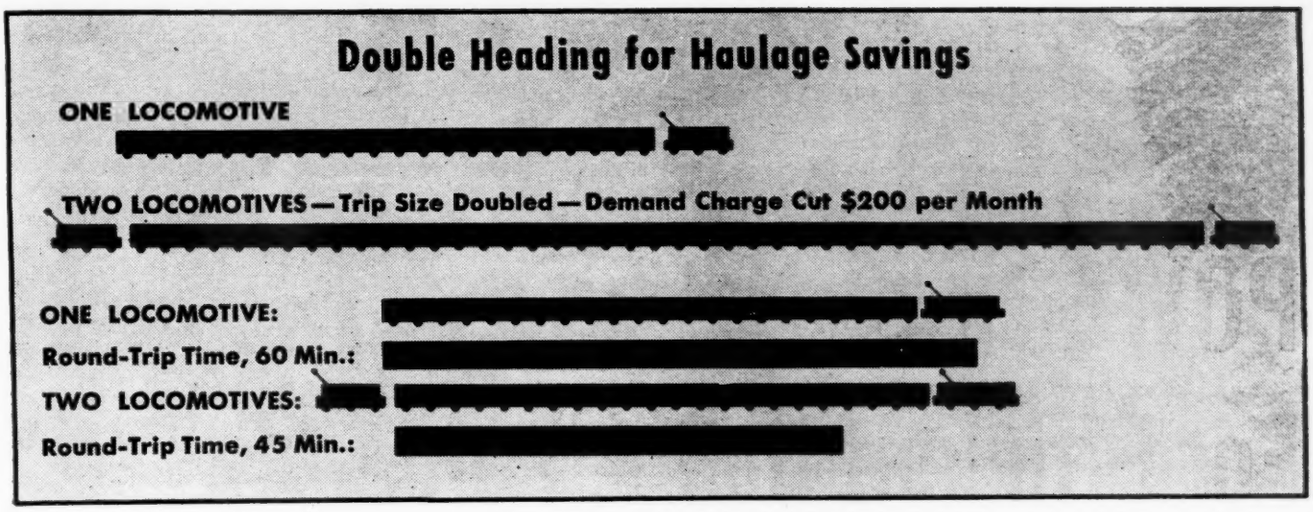
Good track, good roof support, good drainage, short routes and grade elimination facilitate efficient transportation.

Heavier rail leads the list of steps taken by "Coal-for-Victory" winners in improving their haulageways. Well over half reported increases in rail weight from 20 to 50 lb., 30 to 60, 70 and 85; 35 and 40 to 60, 45 to 80, 40 and 60 to 85, and so on, including one or two from 16 and 20 to 30, 30 to 40, etc. Few operations report main-line rail weights of less than 60 lb. at the present time.

Several award winners reported welding of joints on new installations and a number on experience with welding going back several years. Bronze is used by some in new installations. Steel is more common, however, and users include one company that conducted tests on various joints to find out which gave the most resistance to breakage. The result was selection of a joint with a plate under the base and back-up clips under the V-weld in the head. It is reported to give a joint almost as strong as solid rail.

Experience with welded joints (primarily of the aluminum-compound type) goes back several years at a number of "Coal-for-Victory" mines. One reports a few tamping breaks but no others over several years. Another, with a mile of 60-lb. track so welded, reports no breaks in five years; another, 2½ miles of 60, two or three breaks in five years. Experience with steel welding includes one operation that started its use in 1942 with no breaks since.

Treated ties are employed at a number of "Coal-for-Victory" mines and others are beginning their use. Practically no replacements since 1937 is the report of one operation, with others installing them both earlier and later offering substantially similar experience records.


Double Heading for Haulage Savings
ONE LOCOMOTIVE
TWO LOCOMOTIVES — Trip Size Doubled — Demand Charge Cut $200 per Month
ONE LOCOMOTIVE:
Round-Trip Time, 60 Min.:
TWO LOCOMOTIVES:
Round-Trip Time, 45 Min.:

To match other construction standards, care has been taken to insure good drainage on haulage roads. Ditching all along with sumps at intervals is common practice.

"Coal-for-Victory" mines offer a number of examples of permanent roof supports of various types on haulageways. Hitch-drill timbering, for example, is gaining in popularity, while the advantages of hitching have led some operators without drilling facilities to hitch by hand. Bars normally are of steel and may be set directly in the hitch holes. Others use steel pins such as car axles, with plates on which the bars (6- or 6x8-in.) rest. Experience has been good—no failures, for example, since 1937 at one property.

Steel bars and legs are standard at another property. Several treat wood to increase its life, and one mine that has had locust on its main line for many years reports that it still is holding, with practically no failures.

Another method of roof support at several "Coal-for-Victory" mines is the sand-cement coating. One that has employed this method for ten years or more reports that it needs only spot patching once a year, requiring usually not over five man-shifts. Another seals top and coal with a thin coat in entries with a life of as little as three years. Maintenance is on a schedule of one to 1½ years. The repair schedule is yearly at another property with about 1⅓ miles sand-cement treated. Cost, labor and materials, is about $800 to $900 annually.

Appreciation of the importance of grading as a step to greater haulage efficiency, reduced demand and power consumption and lower maintenance is evidenced by the fact that it is almost universal practice. Most operators hold to a maximum grade of not over 1 to 2 percent against the loads, although some tolerate maximums of as much as four. Correcting grades involved, in some cases, complete regrading of the entire main-line system, as at one operation in 1945. At another using rubber-tired haulage—since temporary track is not required close to the face—the practice is to run levels and cut and fill to meet standards.

Along with very deep cuts and fills (up to 15 or 20 ft.) even tunnels have been resorted to as grade reducers. In one mine, where there was a rise of 31 ft. in less than 1,000, a tunnel 556 ft. long was driven under the hump to cut the grade to the standard of 2 percent.

Cutoffs Save Distance

Elimination of grades, as well as reduction in distance, was the objective in several new main and cutoff entries at "Coal-for-Victory" mines. In two cases new main lines were driven through barriers and graded to keep the maximum at 1 to 2 percent. Cutoffs included one at a mine giving haulage improvements major credit for increased efficiency in 1945. In addition to elimination of heavy grades, distance to one section was reduced 1,000 ft. A slant through old workings cut the haul about 800 ft. at another operation but, more important, got rid of heavy grades. This project included grading of 10,000 ft. of main line and replacement of 45-with 80-lb. rail on treated ties. Joints were bronze welded.

One mile was cut from the haul to one section at another "Coal-for-Victory" mine, along with a substantial grade reduction. A 2½-mile haul on a 5-percent grade requiring three 10-ton locomotives was cut 1½ miles at another mine, eliminating two locomotives per shift, reducing cost of maintaining the main haul and speeding return of cars to the face, by a cutoff and a 4,000-ft. inside slope on an 8-percent grade. One locomotive now relays from this inside slope to the main slope.

A reduction of 3,000 ft. in haulage distance was accomplished at a mine in 34-in. coal by driving a new cutoff. Better timbering, grading to eliminate swags and use of heavier rail accompanied distance reduction. Grade was reduced from 12 to 4 percent and distance from one section ½ mile by a cutoff at another operation, which added a 100-car passing track to further speed up haulage.

Reconstruction of the main haulage accompanied by building of a new tipple provides a 1-percent grade in favor of the loads at another property. Formerly, a 3-percent grade against the loads forced breaking up and reassembly of the 40-car trips. A 1,500-ft. reduction in round-trip haulage distance, in addition to other advantages, is expected to make possible elimination of one locomotive.

Double tracking is relied upon in a few instances to prevent interference and accidents and speed haulage. Where one route is employed, as in the majority of the mines, considerable attention has been given to correct location of passing tracks and installation of new ones, along with dispatching and block signals, to achieve the same objectives.

The time-saving possibilities of these and other steps, including electric switchthrowers were supplemented by such additional measures as replacement of right-angle throws with parallel-throw types. The saving in time required to throw a switch was estimated at 10 seconds at one operation. Switch-construction standards include guard rails and blocking, plus concrete or asphalt over the entire switch at some mines to prevent injuries and damage to switches from derailed cars.

POWER
For Efficient Operation

GOOD POWER is a major objective in operations at "Coal-for-Victory" mines. Very few have not increased voltage substantially in recent years and the exceptions include many that already had high standards. The large majority also have added substation capacity to raise voltage and serve increasing loads, the latter usually coming from more use of mechanical-loading equipment.

Results include such examples as the following: (1) same power bill now for two mines and 300 to 400 tons more output as previously for one (with the help of new cars), 230 to 250 volts at face; (2) 9c. per ton power cost three years ago and 6c. now in spite of full-scale washer in continuous six-day operation and heavy pumping load, by raising average voltage from 200 to a minimum of 230 at the machines; (3) reduction of 3½c. per ton in maintenance and 2c. per ton in power cost by raising voltage from 160 to 225 to 250 volts at the face; (4) 10 percent cut in equipment maintenance by raising voltage from average of 210 to 240. All these are full-mechanical mines using high-capacity loading machines and other equipment to match.

Experience at conveyor and hand-loading mines parallels that at loader operations. One hand-loading property, by moving up substations and installing more copper to keep minimum voltage at 500 and the average at 550, reduced cost of power 1c. per ton and cost of maintaining equipment 5c. Another primarily hand-loading property, also using a few conveyors, gave better bonding a big share of the credit for a higher voltage and a reduction in power cost of 5½c. to 4. A reduction of from 6.5 to 5.5c. in power cost was achieved at another operation by boosting copper and eliminating heavy grades on the haulage road. At another mine, double-heading of trips, preventing locomotives from ganging up on the hills, was given credit for a reduction of $200 per month in the demand charge.

EFFICIENT A. C. SERVICE

Proper location of transformer stations, protection of circuits and good power factor make for better a.c. service.

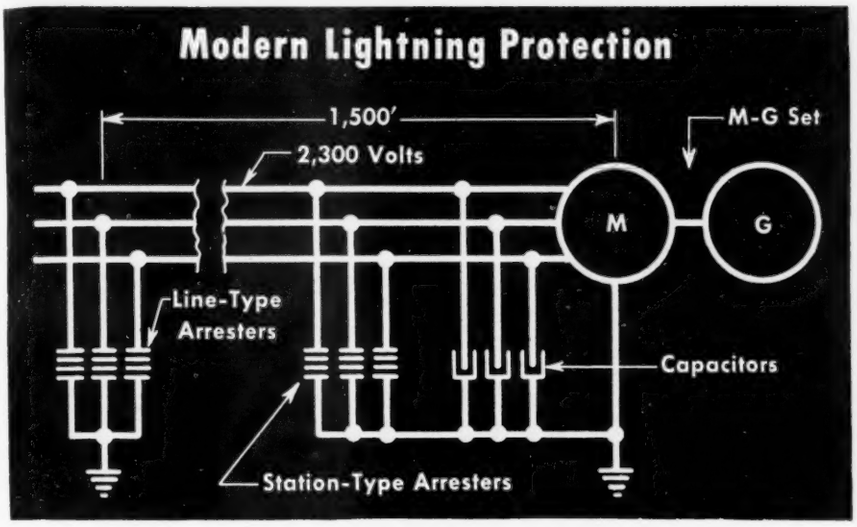
Boreholes and crop openings are the preferred methods of serving underground workings with power at "Coal-for-Victory" mines. However, there is more of a tendency to divide on placing the conversion equipment underground and taking the high-voltage a.c. to it, or keeping it on the surface and taking d.c. down. Regardless of the choice, however, service from close-by points either by boreholes or new openings is the rule at the majority of the mines surveyed. Nevertheless, several find satisfaction in service through underground cables. One group of mines powering face equipment with a.c. uses portable substations made up of flameproof transformers and serves them through armored cable. Another property recently installed 8,500 ft. of rubber-jute cable for 4,000 volts to replace an old line in poor shape and permit moving substations closer to the working sections. Still another serves rectifier equipment underground with 5,000 ft. of parkway-type cable for 2,300 volts laid in the open on the mine bottom. Absolute minimum d.c. voltage at the face at this property is 250. An old cable for 2,300 volts laid on the floor in the slope of another property was replaced by a new one in a coal slot near the roof. At still another, a rubber-sheathed cable for 2,300 volts was laid in clay along the track.

Power is generated at 2,300 volts at one property and now is boosted to 4,160 with transformers. Consequently, the line drop is now 9 percent instead of 28 percent with 2,300. Increases in conductor size were few, reflecting correct choice at the start, but included low as well as high voltage, such as No. 6 to No. 2 for 440 volts at one mine.

Paced by equipment accompanying new rectifier units, there was a definite trend toward the use of non-inflammable

Efficient Power for Mining

1. Transformer stations close to load centers.
2. Central metering, with individual metering of branch lines and loads.
3. Ample conductor size.
4. Good lightning protection and grounding.
5. Ground-detecting equipment—both high- and low-voltage circuits.
6. Power-factor correction.
7. Non-inflammable transformers, especially underground.
8. Voltage equal to or better than nameplate rating at the machine.
9. Transformers or d.c. conversion units close to working sections.
10. Regular voltage checks with meters.
11. Good returns—good bonding supplemented with copper where necessary.
12. Ample copper on the positive side.
13. Full-automatic substation controls.
14. Load distributors where necessary.
15. Sectionalizing for protection.



transformers underground not only with conversion sets but in supplying a.c.-operated equipment. Installation of several air-cooled or dry-type units both with conversion equipment and for other service also was reported.

Location of main transformer substations required no change at most "Coal-for-Victory" mines, although several found that new conditions made moves profitable. At one property, the move was three miles to a new section of the mine. At another, a second a.c. feeding point was established in the center of the working area, which is served through a borehole. A third moved its 2,200 volt station one mile closer to the load center and changed to central metering. A fourth planned to combine two metering points into one, involving building a mile of line to a new opening. A fifth also moved transformers a mile. A sixth shifted the station to a point midway between two loads 7,800 ft. apart. In addition to changes to get central metering, several operations have installed or are planning metering in individual circuits.

Protection against lightning has made major strides at "Coal-for-Victory" mines in the past two or three years. Installation of new arrester equipment is reported by a large majority. In nearly half the cases, the arresters were accompanied by capacitors for additional protection to equipment units. At one operation that replaced old equipment with new-type arresters, no outages have been experienced in 1½ years. Previously, there were several a year. At this property, the fan, tipple and other major loads are on separate lines to localize the effects of any trouble that might occur. As a result of adopting new arresters at another property, no shift was lost in 1945 against four to five days a year before.

New arresters with capacitors were installed at another property that always used a fourth ground wire on its pole lines. Continuous grounding systems also included very comprehensive ones using such materials as worn-out rope and cable tied in with a static-wire system where installed. The latter, incidentally, is expected to provide additional protection. For earthing, cables are laid spiderwise in low damp spots to supplement salt grounds. At another property, a similar system covers a lineal distance of 35 miles.

In addition to use of synchronous drives and better matching of motors to loads, many "Coal-for-Victory" mines installed capacitors to bring power-factor to unity or close to it—normally 98 percent or better. One installation costing $574 raised power factor from 70 to unity with a saving of $100 per month. Locations included tops of boreholes and rectifier substations fed by cables underground. Because of variations, a voltage regulator is planned for the end of the a.c. line serving one property. Ground-detecting equipment was being employed at an increasing number of operations to reduce interruptions and get better service.

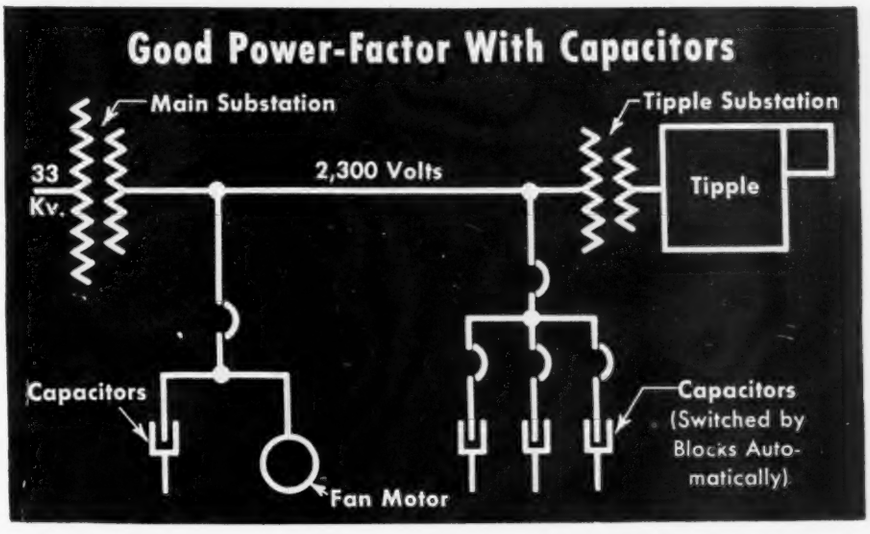
HIGH-TONNAGE D.C. SERVICE

Ample substation capacity, ample copper, good returns and stations close to working sections assure high efficiency and low maintenance cost by providing rated or better voltage at machines.

Modern mining is vitally influenced by power supply, and appreciation of that fact at "Coal-for-Victory" mines is reflected in high standards for d.c. face voltage, gained by better returns, more copper, keeping substations closer and other measures, including increased use of load distributors to help out stations affected by haulage.

In only a few instances do "Coal-for-Victory" mines have a minimum of 200 volts at the face in d.c. service. The large majority set 225 or 230 volts as the minimum or average and a fair number require 240, 250 or 260, with a few reporting 270 or 275 as the average and 250 tolerated only temporarily in isolated instances. In other words, the large majority of these properties maintain a voltage at the machine equal to or better than the nameplate rating.

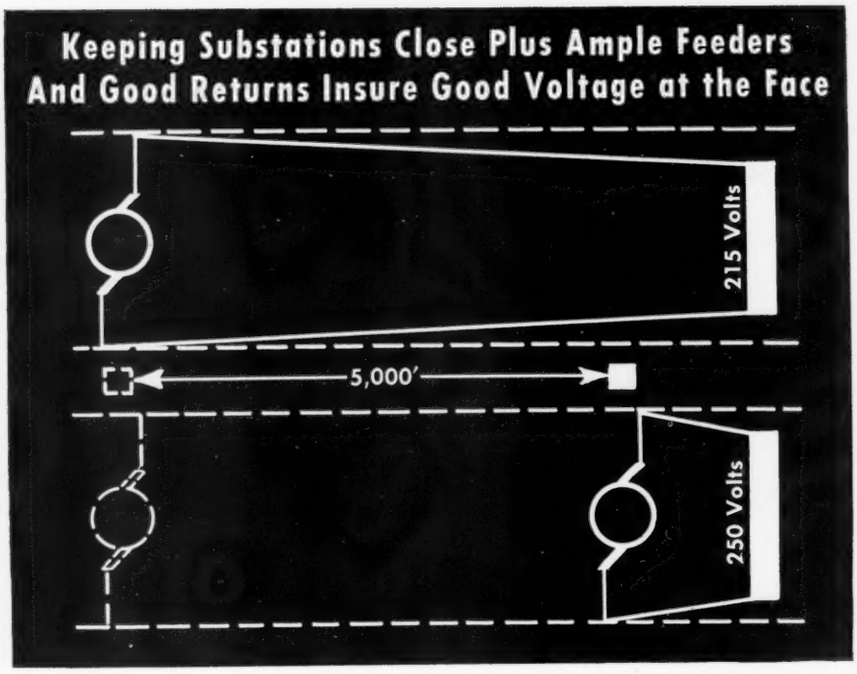
To maintain standards, naturally, it is necessary to know what is happening. Consequently, most of the properties check the voltage regularly with the equipment in operation. A fair number maintain recording meters for this purpose, which may be left on suspected circuits as much as a week. For quick spot checks, some operators use tong-type testers. At a considerable number of mines, the test schedule is once a week and usually the responsibility is



placed on the chief electrician or master mechanic. From once a week, intervals run up to twice or three times a year. Even when intervals are short, more comprehensive surveys may be made at intervals by the electrical engineer. A number of mines handle the problem by employing consulting firms specializing in electrification, these firms checking voltage and recommending changes to maintain standards. To reach these standards, some operators started at as low as 160 volts, with 175, 180, 200, etc., fairly common.

Keeping substations close is one of the major methods employed at "Coal-for-Victory" mines to maintain voltage. At mines using loading machines, maximum distance from substation to face was reported to range from 7,500 down to 1,500 ft. In the majority of cases, the range was 4,000 to 5,000 ft. At conveyor operations, the maximums tended to run higher (4,000 to 6,000 ft.) and still higher at hand-loading operations (6,000 to 8,000 ft.). All these distances, incidentally, are for nominal 250-volt service—much greater ones are tolerated in 550-volt mines.

Turning to average distances, the minimum at 250-volt mines using loading machines was 800 ft. (1,500 ft. maximum) and the maximum was 5,000. The majority fall in the range of 2,400 to 4,000 ft. In conveyor mines most of the averages are between 3,000 and 5,000 ft., while in hand-loading mines 5,000 ft. is the common figure for average distance.



Copper Increased

Shortening the distance, however, is not the entire answer to better voltage. Consequently, "Coal-for-Victory" mines use plenty of copper and provide good returns. To take the latter first, one operation which, as previously noted, cut power cost from 5½ to 4c. per ton, went over rail bonds and added cross bonds every 200 ft., rounding out the job by adding feeders tied into the trolley also at 200-ft. intervals.

In addition to welding and bonding of both rails, steps to get good returns included: (1) 500,000-cir.mil auxiliary return tied into two 60-lb. bonded rails at 300-ft. intervals on main lines and a 4/0 wire parallel to 40-lb. fishplated rails in panels; (2) 500,000-cir.mil auxiliary return with 40-lb. steel in panels; (3) 1,000,000-cir.mil with welded 60-lb. rail on main line; (4) 4/0 return with two bonded rails on main line plus three 4/0 lines to each conveyor territory—one for the cutter, one for the conveyor drive and one as a general return for both.

Revisions on the hot side included numerous changes from 4/0 to 6/0 or 4/0 and 6/0 to No. 9-section trolley wire, usually paralleled by 500,000-, 750,000-, 1,000,000- or 1,500,000-cir.mil feeders along main lines. Feeders of 500,000-, 750,000- and 1,000,000 cir. mils in parallel with 4/0, 6/0, or No. 9-section wire were common in room territories. As an example of results, one operation that moved substations up and installed 350,000- to 500,000-cir.mil feeder from one and 500,000 from another in parallel with 4/0 trolley wire brought face voltage up to 250 from 160 to 225. Loading machines are used. At a hand-loaded conveyor operation, as another example, face voltage was raised from less than 200 to 230 or better by double-bonding rails, adding 500,000- and 1,000,000-cir.mil feeders and a 4/0 return. The power improvement was a big factor, along with better supervision and reduced maintenance, in increasing tons per man-shift (36-in. coal) from 5.00 in 1943 to 6.15 in 1945.

Rectifiers, usually portable, were preferred by "Coal-for-Victory" mines in making additions to substation capacity. One reason for this preference was low maintenance, one operator reporting that a set ten years old had required only $100 for repairs in that time. Rectifiers normally were accompanied by full-automatic controls and similar facilities have been added to many existing rotating sets for manpower conservation—usually saving one man a shift.

Growing appreciation of its importance was reflected in a substantial increase in sectionalizing of d.c. systems at "Coal-for-Victory" mines. While a number have started to sectionalize by installing manually-operated switches to permit isolating sections where trouble occurs, many mines now employ full-automatic breakers for automatic protection. Several mines provide an automatic reclosing breaker with each loading unit, which moves when it does. In addition, haulage circuits may be sectionalized by up to three or four or more automatic units, while some mines employ quick-break switches for each panel and at 1,000- to 1,500-ft. intervals along the trolley and feeder systems to supplement automatic equipment.

Tie breakers also are employed at several properties for such purposes as added protection for sets serving main haulage, to isolate sections of mines in case of difficulty and to prevent haulage, where trouble is more frequent, from affecting other operations. Where two or more conversion sets are employed (with or without automatic reclosing breakers—usually with) a number of operators are completely isolating sets by installing dead blocks to further minimize the fire hazard. This is an extension of the principle of keeping haulage and other activities on separate sets—the practice at several "Coal-for-Victory" properties.

As a further safeguard against fires, one operation using dead blocks has segregated hot and cold lines into rooms by using single separated lines, then employing short 40-ft. portable cables to reach the face. Cable fires have been materially reduced. Four sacks of rock dust are kept at each cable junction. Piling cable is forbidden. Instead, it is looped out on a board so that the air can cool it.

VENTILATION
For More Tons Per Man

THE BASIC principles underlying the drive for better ventilation at "Coal-for-Victory" mines include the following:

1. Quantity varies directly as the velocity.
2. Pressure, or water-gage, varies as the square of the velocity.
3. Power varies as the cube of the velocity.

Saving in quantity and velocity, therefore, results in considerable reductions in ventilating cost or, in the other direction, more air with no increase in cost. Modern fans, ample airways, leakage reduction, one-way travel and splitting are among the steps to more efficient, lower-cost ventilation at "Coal-for-Victory" mines, which also get the advantages of better working conditions—a cooler, fresher atmosphere, reduction of smoke and dust and elimination of methane and its attendant hazards.

ECONOMY WITH MODERN FANS AND SHORTER AIR TRAVEL

Late-type fans are economical in power because of their inherently higher efficiency, closer match to mine characteristics and greater adaptability to varying conditions. Shortening air travel saves power.

Half or more of the "Coal-for-Victory" mines have added to or replaced fan equipment since the war or in the past two or three years. Where additions were made they frequently serve separate sections of the mines. As an example, one mine put in a 6-ft. centrifugal fan at a separate opening to serve one section. This permitted increasing volume from 28,000 to 40,000 c.f.m. while reducing water-gage on the original unit from 2 to ¾ in. and horsepower from 25 to 19. Considerably higher efficiency was gained by this plan instead of attempting to increase the size and output of the original unit. At another property, plans call for making the present unit (71,000 c.f.m., 4-in. water-gage) a standby unit and installing a new propeller unit in the same location. With a 100-hp. drive—the same as the original—the new one will deliver 15 percent more air.

A reduction of 100 hp. was achieved by replacing an old centrifugal fan (kept as a standby) by a new propeller unit at another property. With a capacity of 200,000 c.f.m. at a 4.2-in. water-gage, the old unit required a 300-hp. motor; the new, 200. Air at another property was increased from 35,000 to 60,000 c.f.m. and horsepower cut from 20 to 15 by a new fan.

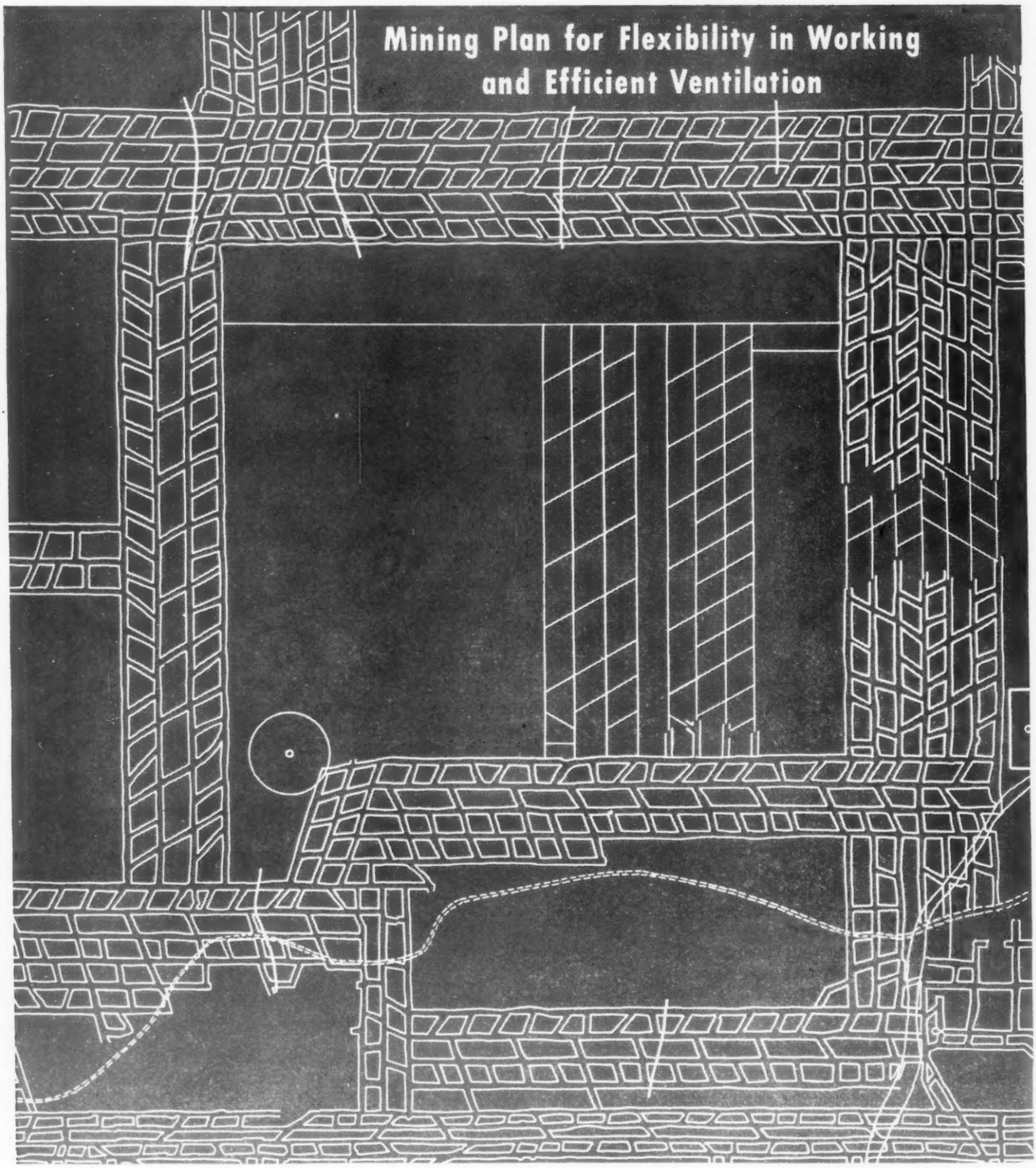
Shortening air travel vies with new fans as means of reducing power, improving service and reducing leakage. Consequently, new shafts, drifts and other openings were made at a number of "Coal-for-Victory" properties to reduce travel or get complete one-way circulation in sections if not over the entire mine. At drift mines in hilly country many operators regularly hole through to the outside for one-way circulation or, as indicated previously, to set up separate ventilating systems for various working sections. One shaft operation recently put a new upcast shaft into service at the back of the property. One result was an increase of 40,000 c.f.m. in circulation. By putting new slopes and openings at the back of the mine, another company provided additional intakes and three more escapeways. Also it eliminated returning the air 5½ miles and permitted service farther from the fan with no increase in water-gage.

Relocation at points closer to workings accompanied a number of new fan installations, thereby achieving two benefits at the same time. Examples include the following:

1. New propeller fan placed 1,500 ft.

WAYS TO BETTER VENTILATION

1. Modern fans—high efficiency with reduced power cost.
2. Shorter air travel—new openings for one-way movement and to get fans closer to workings.
3. Standby units or standby drives.
4. Automatic controls and motor protection.
5. Ample airway area for reduced velocity.
6. Clean, straight airways, plus slants and long curves—reduce friction and turbulence.
7. Good roof support to reduce falls.
8. Good, tight incombustible stoppings to minimize air leakage.
9. Positive methods of getting air to the face in working territories.
10. Splitting and overcasting for better air, more safety and lower cost.



closer to workings in place of 4x5-ft. exhausting unit. Air circulation was increased from 16,000 to 33,000 c.f.m. with the same horsepower (10).

2. New propeller fan installed at shaft 2,500 ft. closer to workings; works in parallel with old unit with common airway. Volume increased 25 percent and water-gage cut from 2 to 1½ in. as a result of splitting return through two main sections of mine.

3. Propeller fan moved to new two-compartment air and escape shaft 1¼ miles nearer working sections. With 130,000 c.f.m., the move cut water-gage from 3 to 2.3 in. and permitted operation with a 75- instead of 100-hp. motor.

4. A new propeller fan (120,000 to 150,000 c.f.m., 4-in. water-gage, 100 hp.) being installed at air and man shaft 4½ miles from portal to supplement present unit—130,000 c.f.m., 3½-in. water-gage. When the new unit is in, motor horsepower will be cut from 100 to 50 on present unit. A third fan now being planned for.

5. New 160-ft. air shaft being sunk with 15-in. pilot borehole near workings for new propeller fan to run in series with present unit.

6. New 65-ft. air shaft, sunk by clamshell in combination with raising with machine loading, put down at halfway point. Finished with sand-cement lining. Equipped with new centrifugal fan

—95,000 c.f.m., 2-in. water-gage, 50 hp. The original propeller unit at the drift mouth (75,000 c.f.m., 6-in. water-gage, 50 hp.) is being left in place as a standby.

7. Two miles cut from air travel by new fan at new location.

8. Shaft at new workings equipped with new exhaust fan with 3-in. water-gage (two intakes). Will hole into old section 5,000 ft. away and use as intake.

9. New fan replaced three old units and shortened air travel 5,000 ft.; 30,000 c.f.m. more with same horsepower.

10. New fan cut off about two miles of travel and eliminated a lot of old entries; new unit, 145,000 c.f.m., 3½-in. water-gage, 125 hp.; old, 86,000 c.f.m., 5½-in. water-gage, 125 hp.

11. Changed from blowing to exhaust with installation of new fan 3,000 ft. closer to workings. All doors changed, three overcasts added, entries increased from three to seven headings and one intake added. Air volume increased from 30,000 to 75,000 c.f.m. with same water-gage (3-in.) and same horsepower (35).

12. Changed from blowing to exhaust with installation of new propeller fan at shaft 2½ miles closer to workings. Changed all doors and built five overcasts. Intakes increased from one to three and main entries from three to six. Volume increased from 170,000 to 250,000. Water-gage reduced from 4¼ to 1.9 in. and horsepower from 150 to 90.

Standby-fan drives are being installed in increasing numbers if reports from "Coal-for-Victory" mines are any criterion. They range from standby motors to special gasoline engines with the necessary belts or couplings. In some cases, where steam is available, standby units also are provided with auxiliary steam drives. Full-automatic controls are installed on a number of remote units, normally saving a man a shift. Some controls take care of everything but an a.c. power outage, including signalling the dispatcher and cutting in the auxiliary drive. Several operators have equipped fan motors with phase protection, the cost of which normally is saved by preventing no more than one or two burnouts.

BETTER AIRWAYS

Ample airways, clean and straight, with tight stoppings deliver more air to the face and reduce cost of ventilation.

Increasing number of headings for more coal per territory and additional escapeways (already referred to in this and earlier sections) is paralleled by increasing them for more airway area and a reduction in velocity. Thus, main entries have been raised from two, three or four headings to six, seven and eight and room entries from two to three, four, five, etc. Rough, crooked airways choked with falls, however, reduce available area, increase velocity and create friction and turbulence. A number of operators, therefore, are cleaning up for better air by hand, conveyor, slusher or loading machine. Some leave track to facilitate this operation and several employing shuttle cars state that they perform well in such work.

Better attention to support of airways has led to use of treated material and such projects as 4x10 crossbars on oak legs on 4-ft. centers. Some operators, however, prefer to take the bull by the horns and take down as much as 10 to 15 ft. of top to reach solid material that will stand without timbering. Results of clean-up operations include raising air circulation from 28,000 to 31,000 c.f.m. at one property. Air volume was doubled by cleaning cross-entry aircourses at another property. Examples of other jobs include: (1) 3,000 ft. cleaned and retimbered in eight months with the work continuing; (2) 2,000 ft. main return cleaned and retimbered and 1,000 ft. new intake driven; (3) 1,200 ft. straightened and retimbered and 900 ft. new main return driven, increasing volume from 53,000 to 68,000 c.f.m.; (4) 1,350 ft. of return straightened and retimbered, increasing volume from 80,000 to 104,000 c.f.m.; (5) all of main airway (3,000 ft.) cleaned and enlarged, etc.

Making Air Flow Easier

Taking off corners, straightening, removing obstructions, introducing curves and slants, concreting and sealing with sand-cement mixtures were steps taken at "Coal-for-Victory" mines, along with feathered approaches to overcasts and other measures, to reduce turbulence, friction and water-gage.

In getting the air to the face numerous operators have turned to line brattices. In one case, in thin coal, width of the cloth was raised from 36 to 48 in. to make possible a better job along the top and bottom. A second popular method of getting the air to the face was a check curtain or door at the first room and a line of curtains or stoppings to direct the air to the top of the rooms.

Back of the room panels, in which one or two operators employed new-type interlocking blocks (plastered), which can be recovered easily for further use, wood and gob were rapidly going out of style for permanent stoppings. Even where wood is being retained temporarily it is being plastered to reduce air loss. Solid concrete blocks, cinder blocks, brick and tile, frequently plastered in addition, now are practically universal as materials for permanent stoppings in "Coal-for-Victory" mines. The fact that plastering already incombustible stoppings can help materially is evidenced by a report that volume was increased 3,000 c.f.m. in 1,500 ft. in one mine. Some 2,000 c.f.m. was picked up by plastering old cinder-block stoppings at another property. One property with tile stoppings went to the practice of building a second stopping 4 ft. away and pumping the interval between the two full of sand to stop leakage through the coal.

SPLITTING FOR LOW COST

Proper splitting of currents improves ventilation, promotes safety, cuts water-gage and reduces power cost.

Growing appreciation of its advantages has resulted in a large increase in splitting air currents at "Coal-for-Victory" mines which, in addition to other benefits, eliminates doors equal to or greater in number than the overcasts necessary. In one case, one overcast eliminated three doors. All doors were eliminated in another property by overcasting to each room panel and undercasting under each belt. In still another, number of splits was increased from three to eight by the installation of five overcasts. From one to five splits was another report, three to five at another and so on.

Two new splits in each mine at one property permitted a 20-percent increase in air volume. At one mine, the respective volumes were 61,000 to 78,000 c.f.m. Increased overcasting and splitting at another property is reported to have permitted ventilating 100 percent more area with no increase in fan water-gage.

A fair number of "Coal-for-Victory" operators have, in the words of one, "quit fooling" and gone to a split with overcasts for every working panel. That practice, they contend, automatically makes for the best possible ventilating conditions, lowest cost and greatest safety.

One operator opening up a new territory has adopted the development plan shown in the accompanying illustration. Areas to be worked are first blocked out by driving all around them, which reveals grades and permits opening from the most favorable side for haulage and drainage. Ventilation into the area is established by overcasting and when the rooms are driven up ready for pillar removal, bleeder openings are cut through to the closest entry. Air then travels across the active working places and on through the gob area directly into the return and no returns are necessary in the working territory itself.

DRAINAGE For Low-Cost Mining

SEVERAL "Coal-for-Victory" mines are in the happy position of having no water. In one or two instances, in fact, water must be taken in (one property has two boreholes for this purpose) for sprinkling because the workings are so dry. The majority, however, are not so fortunate. Nevertheless, they have made the best of the situation by taking steps to keep water out of workings, calling on gravity to help out in removal, consolidating handling facilities to reduce the pumping problem, installing modern equipment and employing acid-resisting materials for lower cost.

GRAVITY HANDLING— LESS POWER

If water cannot be kept out of workings, handling by gravity saves power, equipment and labor.

Work for economical drainage starts on the surface at many "Coal-for-Victory" mines, which report that where breaks can be located they are ditched around, dammed off or flumed over to keep water out of the mine. Damming and ditching at one property kept out 100-g.p.m. in wet seasons. Cracks are grouted at another mine, which also uses dams and pipe to carry off surface water. When breaks can be found they are sealed at another operation. A creek was changed at still another property. Another grouts under stream beds from inside the mine and reports that it invariably dries up inflow through the strata.

Underground, gravity methods include ditches—widely used—and the old reliable siphon. The latter is found at several properties and one mine relies on it entirely for drainage. Among the ditching projects reported at "Coal-for-Victory" mines are the following:

1. Natural drainage to drift created by 600-ft.-long ditch 5½ ft. deep laid with tile pipe with manholes for cleaning every 50 ft. One 100-g.p.m. pump was eliminated as well as others that would have had to have been installed. Eight gathering pumps discharge to the ditch.

2. Ditching across the mine to the other outcrop eliminated 700 g.p.m. of pumping capacity in wet weather and 400 in dry. As the mine developed, a 400-g.p.m. centrifugal pumped to the drift. Then a sump was put in with 80-ft. borehole and 300-g.p.m. pump. This sump and pump are now used two hours daily to dewater one section of the mine not reached by the ditch.

3. Two 5x5-ft. drain entries were driven 50 to 60 ft. to connect workings with central sump with a 1,000-g.p.m. pump and 12-in. borehole 285 ft. deep. The two 5x5 openings cut off five pumps and a total of 20 10-hp. pumps were eliminated by the system connecting into the sump, made by building dams. Production was increased at least 10 percent by drying up working places.

4. Ditching and laying 1,500 ft. of 8-in. sewer pipe eliminated two pumps.

5. Ditching includes one 180-ft.-long section 5 ft. deep with concrete culvert. Ditches lead to 3-, 6- and 8-in. boreholes (latter with 6-in. casing) discharging water to old mine 90 ft. below, which acts as sump.

6. Ditches driven to outside drift—no pumps.

7. Ditch 300 ft. long with average depth of 3 ft. (11 ft. at drift) laid with 8-in. tile; eliminated four small pumps.

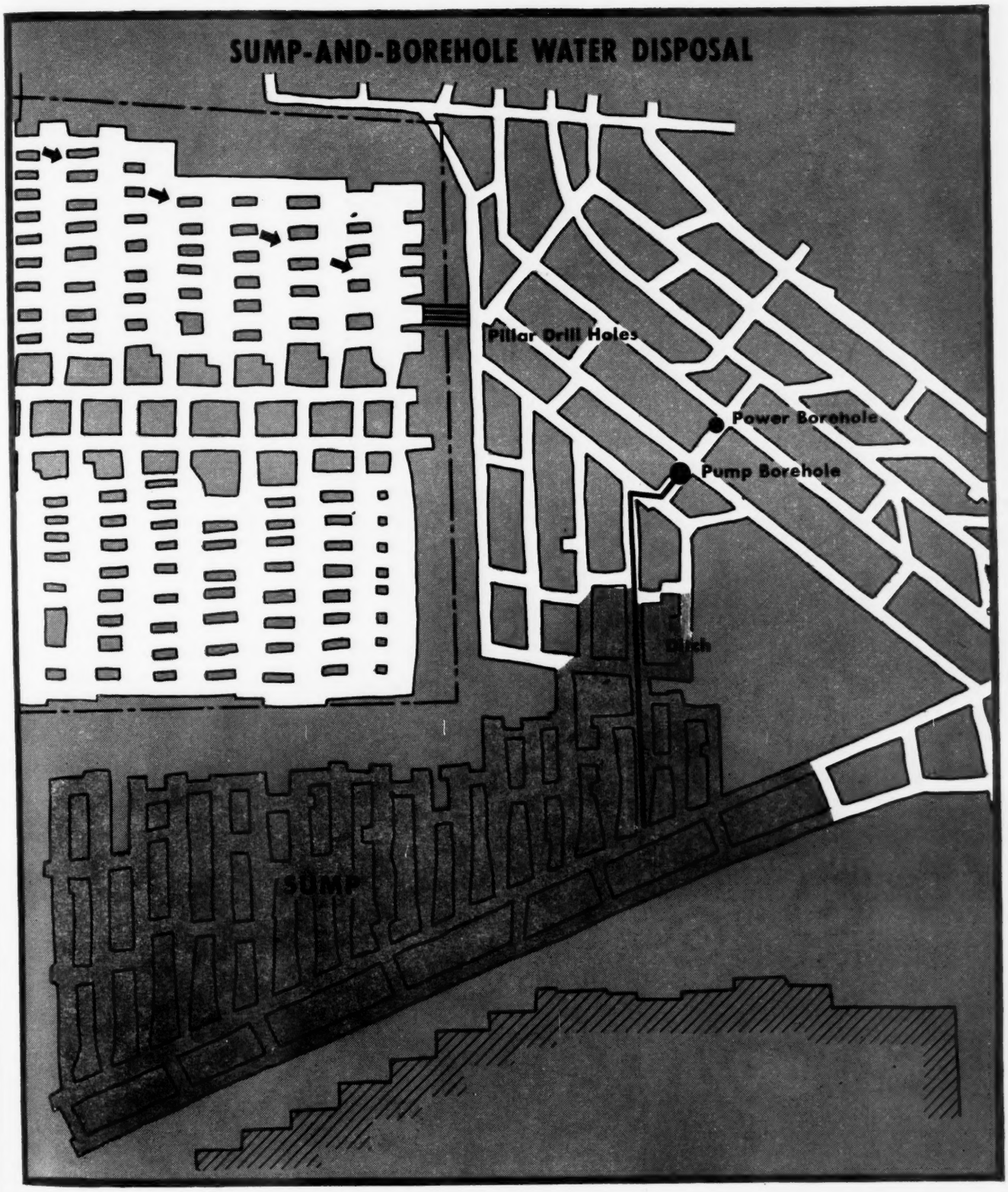
8. Ditch 5,000 ft. long carries all water from gathering pumps to main sump with 5,000-g.p.m. pump at old shaft. Ditch eliminated about 7,000 g.p.m. of main and gathering pumps.

9. Ditching originally eliminated 22 pumps. Mine now dewatered with 1,800-g.p.m. centrifugal and seven-stage vertical turbine unit with a rating of 2,000 g.p.m.

10. Ditches permitted gravity drainage from one section and eliminated 12 gathering pumps. Mine now served by

LOW-COST WATER HANDLING

1. Ditches, dams and flumes to keep water out of mines.
2. Sealing and grouting to dry up flow into workings.
3. Ditching, drainways and siphons underground for gravity handling.
4. Sumps to consolidate pumping.
5. Boreholes to the surface or outcrop to cut pumping distance.
6. Modern pumping equipment with automatic controls.
7. Large pipe to cut power cost and increase capacity.
8. Acid-resisting pumps and pipe.



two sumps with four boreholes to the surface.

11. Drove into old works in 1945 to permit gravity drainage through abandoned mine to outcrop. A 50-hp. 1,000-g.p.m. pump was eliminated. Dams also were installed to force water to flow to a central station.

12. Ditching eliminated four gathering pumps. Pumping improved by installing sump with 3-in. centrifugal pumping to drift.

13. Pumping labor reduced and loss of tonnage in extra-wet weather eliminated by extensive ditching through old works accompanied by construction of guide stoppings of concrete 5 to 6 ft. high to drain water to one sump. Sump will hold capacity of 36-hour inflow in wettest weather and is accompanied by two 2,000-g.p.m. deepwell pumps.

14. Five-horsepower pump eliminated along with need for additional equipment in the future and mine made dryer

by 790-ft. long water-drainage heading.

15. Ditch 3 ft. deep eliminated sump and 300-g.p.m. pump.

ECONOMICAL PUMPING

Modern equipment, ample size of pipe, automatic controls, central sumps and shortening of pumping distance make for low-cost dewatering of mines.

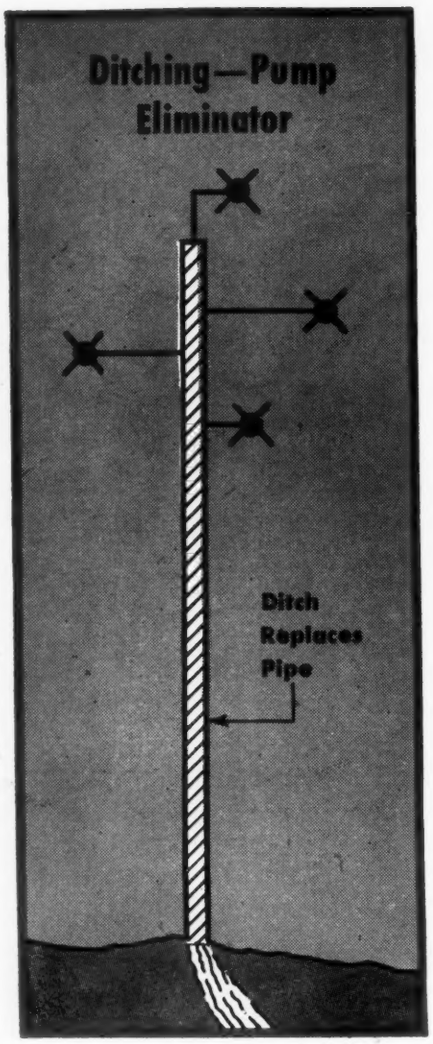
Centrifugals lead the list of new pumps installed at "Coal-for-Victory" mines, especially in the main-pumping category. Deepwell turbine units also were called upon by a number of properties, as already indicated. Two such units at one operation (at the bottom of an old shaft) are to be equipped with electrode control. Another main pump in the same mine is a centrifugal discharging through a borehole. Two deepwells were installed at another mine in 1940. At another, a deepwell unit with a 190-ft. borehole went into service in 1943. In service 15 years, a deepwell at still another property pumps from a sump fed by two 5-hp. and one 1½-hp. gathering pumps.

Dewatering of an old mine was the job of a 2,000-g.p.m. deepwell at one operation. Using a 228½-ft. borehole, head in the old mine was reduced 100 ft. The pump still is used about every five weeks. Two deepwell units pump from the old mine previously noted as the sump for workings 90 ft. above. A third unit is planned.

Water seeping through dams from old workings will be handled by a 200-hp. pump with mercury float-switch control at a 60-ft.-shaft at one mine. Another dewatering adjacent workings used two separate stations and tapped the old works by drilling through the barrier pillars. Five main sumps with boreholes to the surface handle water at this property. Small sumps in each section feed to the main sumps. Capacity of the main sumps range from ½ to one million gallons. Lift from two is 550 ft.; from three, 150 ft.

Boreholes and sumps were, in fact, the major steps to more efficient pumping at many "Coal-for-Victory" mines. At one, a special entry and rooms were driven to establish the sump, as shown in the accompanying illustration. To permit water from old works to drain into the sump, the barrier was drilled with 2½-in. holes with a regular coal drill. Length was 45 to 50 ft. From the sump, a ditch leads to 1,000-g.p.m. centrifugal with float-switch control discharging through a borehole (200-ft. head). A second smaller sump also discharges through a borehole. A borehole to the outcrop at another location is planned in the future.

Other examples of sump and borehole installations at "Coal-for-Victory" mines include the following.



1. Borehole put in in anticipation of installation of 50-hp. pump with float-switch control. Present pumping equipment consists of one 2-in. unit.

2. New section of mine served by 354-ft. 10-in.-cased borehole; saved 1½ miles of pipeline.

3. Borehole for 2-in. line drilled 200 ft. for 50-g.p.m. pump with automatic controls. Other equipment comprises two gathering pumps.

4. Mine served by boreholes with sumps and pumps with float-switch control put down at ½-mile intervals along main entry. A pump and pipe are set in each room panel for more effective dewatering (very wet mine).

5. Sixty-foot borehole and sump for 4-in. pump put in in 1945.

6. Sumps made every 500 ft. along main lines. Water combined and pumped or drained from sealed areas. Some pillars drilled.

7. Two sumps connected and two 1,000-g.p.m. d.c. pumps replaced by one 2,000-g.p.m. a.c. pump. Expect to change all pumps to a.c. and save ½c. per ton in power. Tons of water pumped per ton of coal, 19.

8. All water to one sump for discharge through borehole.

9. Six dams built primarily for water control. Permits feeding water out slowly so small pumps can handle. Also used as preparation-plant supply.

10. Dams built for following sumps: 130,000 gal., 60 hp. 500-g.p.m. pump; 500,000 gal., 60-hp. 500-g.p.m. pump; 1,500,000 gal., 400-hp. 1,400-g.p.m. pump.

11. Central pumping provided by large sump with ditches to it. Water moved 3,200 ft. to drift by 6-in. pipe.

12. Sump with 10-hp. pump eliminated loss of time previously resulting from water.

13. New sump with 75-hp. motor and automatic cutoff installed at shaft.

14. Water drained to lower mine by ditch and four boreholes, eliminating three pumps (320-g.p.m.), 2,400 ft. of pipe and 30 hp. The holes were drilled from the surface.

PIPE AND MATERIALS

Large pipe saves pumping power and corrosion- and abrasion-resisting materials cut maintenance.

By reducing velocity and friction, installation of larger-sized pipe, within economical limits, is saving operators money at a number of "Coal-for-Victory" mines. One, for example, went from 2 in. to 3, then to 4 in. 1½ years ago and finally to 6-in. lines. For face entries, another mine has adopted 4-in. pipe instead of 2- and 3-in. A third increased from 3 to 4 in. in room entries and uses 6- and 8-in. lines on face and main entries. Gathering lines are 2-, 3- and 4-in. at a fourth mine; main lines and boreholes to the surface, 6-, 8- and 12-in. A fifth replaced 5,000 ft. of 4-in. with 6-in. pipe. A sixth changed from 2- to 3-in. At a seventh, changing from 4- to 6-in. line doubled carrying capacity.

Acid water is encountered at many "Coal-for-Victory" mines and consequently acid-resisting materials are widely used in pumps. Bronze predominated, with chrome, stainless steel, phosphor-bronze, lead and others employed, particularly where conditions are more severe. In one case, life of a cast-iron pump was but four days, so bronze was adopted and has not yet failed after months of service. At another property, cast iron lasted but six days, so bronze linings were reinstated.

Acid-resisting pipe employed at "Coal-for-Victory" mines includes wood, cast iron, asbestos-cement, cement-lined, copper bearing and others.

MAINTENANCE
For More Working Time

KEEPING MACHINES AT WORK as much of the scheduled time as possible increases efficiency and cuts cost. One method of getting maximum working time is reduction or elimination of electrical and mechanical delays—in other words, good maintenance. "Coal-for-Victory" mines are getting good maintenance as follows:

1. Frequent inspection and good records.
2. Trained maintenance men, bosses and operators.
3. Good shop facilities.
4. Good lubrication.
5. Use of materials with a long life and less susceptibility to breakdowns.

By taking these steps, a number of operators have reduced mechanical and electrical delays to 1 to 3½ percent, against as high as 15 percent or more before maintenance was tightened up. These records also are reflected in high figures for individual productivity, such as 7.3, 8.0, 10.0 and 12.50 tons per man per shift and so on in 1945.

FACTS FOR MAINTENANCE

Frequent, careful inspection of equipment and working conditions and good records of delays and their causes promote efficient maintenance.

Since knowledge of the causes of delays and breakdowns is necessary for their elimination, "Coal-for-Victory" mines are good record-keepers. Where good systems were not already in effect, a number of operators have improved them. Methods vary but a common start is a report on loader delays and their causes made out by the machine operator, the section boss or both—or by the section electrician or mechanic where they are regularly employed. In one or two instances, records are kept by the time-study engineer. At one mine, institution of this system cut delays 15 percent. Considerable interest was aroused and improvement made at another operation by having the dispatcher keep a record of all delays and their causes, charging them to the proper departments.

In addition to reports, inspection is the mainstay in reducing breakdowns, cutting maintenance cost and increasing machine working time. Schedules for what might be termed "inspections" vary, and in addition most "Coal-for-Victory" operators expect operators and foremen to keep an eye on equipment condition all the time. Where electricians, mechanics or repairmen are kept in the working sections or with the units, formal inspection is daily or "continuous." The usual rule is to formally inspect once a week, the interval running from that up to two or three months at some properties. In addition to regular inspection at the daily, weekly or other intervals, a number of mines have check inspections made by higher authorities or men from the central shop or general maintenance force at regular intervals.

Where inspection is daily or "continuous," it may be done during the shift, stopping the machine if necessary, or during a lunch or waiting period. Many operators, however, try to arrange for inspection on an off-shift and during week-ends to minimize loss of time. When running repairs will save loss of time or a more expensive breakdown later, the rule is to make them when the inspection is made. To facilitate this operation, as well as inspection, some managers bring the machines to the main shops, either underground or outside.

Variations in inspection methods include:

1. Routine check once a week and opening of cases once a month.
2. Routine once a week and movement to the shop once a month for a more thorough check, bearing adjustment and the like.
3. Inspection of all underground equipment in the first two hours every morning by the underground mechanic and his assistant.
4. Greasing of all anti-friction bearings every ten days by electrician, who inspects equipment thoroughly at the same time.
5. Special installation inspections of electrical equipment, requiring approval of electrician and safety engineer.
6. Complete overhauling of drills once a week, cutting drill maintenance to ¾c. per ton, etc.

Inspection by examination also is backed up by meters and recorders at a few "Coal-for-Victory" mines. At one, operating-time recorders have been installed on all loading machines as a check on delay reports. Another using belt transportation has installed strip-chart meters. These provide a full-week's record and show, by recording increased load, when idler-bearing or other trouble occurs.

Several operators have extended the inspection principle on the theory that trouble can arise in mining practices as well as within the machine itself. Voltage checks, therefore, are regular practice at a majority of the mines, as set out in a previous section in this issue. A number also check mine conditions and particularly face preparation because of its effect on machine maintenance as well as on production. At one property, inspection of face preparation is the responsibility of the maintenance foreman who makes the mine regularly and works with the foremen to remedy substandard conditions and practices. Their findings are subject to review and discussion by the superintendent and other mine officials with a direct interest.

Inspection each shift by the maintenance foreman and each week by the shift foremen is the rule at another operation. Each week they get together and make the mine to check on handling of equipment, face preparation and other activities. The general mine foreman and the master mechanic go over their findings and once a month a meeting is held with the general superintendent.

In addition, forums are held at intervals on breakdowns and their causes and other maintenance questions.

PROPER FACILITIES—TRAINED MEN—GOOD MAINTENANCE

Trained men with good tools and shop facilities facilitate maintenance.

The growing use of mechanical-loading equipment, increasing the maintenance load, has resulted in additions to maintenance staffs, more special training and substantial increases in shop space and equipment at "Coal-for-Victory" mines. Many operations follow the policy of giving both new and old electricians and mechanics training in the special problems of caring for modern equipment under the auspices of the chief electrician, master mechanic or maintenance foreman. As an example, each mine electrician employed by one company gets two or three months or more if necessary in the central shop in tearing down, reassembling and repairing all types of equipment used, while machine operators first work as helpers until they are thoroughly grounded in good operation and care of their units. At another, regular classes are taught by the master mechanic and general manager, and face bosses spend a week in the shop before they go to work.

One company had classes lasting 12 weeks in 1944 and six weeks in 1945 for maintenance men with a substantial improvement in work and reduction in delays due to breakdowns. University extension courses have been given at a number of properties. Other examples of training include courses in welding and in machine operation by factory demonstrators.

Reflecting increased appreciation of the value of good maintenance, shops and shop equipment have been materially expanded at "Coal-for-Victory" mines. Examples include the following:

1. Size of outside shop increased one-third; underground shop added for locomotives.
2. Shop in section built for loaders, cutters, locomotives and other equipment.
3. New shop built outside; 10-ton bridge crane and band-type metal saw added.
4. New and larger steel shop building being built.
5. Doubling size of surface shop.
6. New underground shop with pit built; saves tramming equipment 3½ miles.
7. New underground shop for major repairs built two miles closer to workings; repair car ordered.
8. New underground shop includes overhead crane, 20-ton hydraulic press and welding equipment.
9. Plans made to enlarge shop 50 percent and install crane, lathes and other facilities.
10. New shop established five miles closer workings; will enlarge main shop one-third and add equipment for complete overhauling and rebuilding.
11. Central shop built up in 1944-45 to do everything but armature winding; includes new overhead crane with all operations powered; cost of parts alone reduced 0.217c. per ton.
12. Centrally located inside repair shop for repair and assembly constructed.
13. Underground shop, primarily for assembly, moved closer to workings. Expanded outside shop to permit general overhaul of cutters and locomotives as well as loaders.
14. Small repair shop established in each section.
15. Added to machine shop and put in lathe and other tools to make possible doing all welding and repairing.
16. New shop built with bridge crane.
17. Installed new shops in each of two mine sections.
18. Added to shop and put in lathe, drill press and welder.
19. Built new shop (concrete block, 40x120 ft.) at new slope entrance, including 15-ton crane and machine tools.
20. Centralized work and enlarged surface shop from 30x60 to 40x100; equipment includes lathes, saws and 5-ton traveling crane.
21. Enlarged shop 50 percent and added power saw and crane.
22. Enlarged shop 50 percent and added hoist.
23. Installed inside motor barn in 1945.
24. Moved shop one mile nearer workings.

Comprehensive welding equipment apparently is universal at "Coal-for-Victory" shops, with a number reporting good results from metallizing installations. Equipment added to surface and underground shops included: hoists and cranes up to 50 tons, hydraulic presses up to 75 tons, car straighteners, cable vulcanizers (numerous), special trucks for moving loading machines and other equipment, air lines and power wrenches for speeding work on rope-

MAINTENANCE KEYSTONES

1. Records of delays and their causes.
2. Frequent, careful inspection of equipment.
3. Preventive running repairs.
4. Inspection of face-preparation and mine condition.
5. Ample shop facilities close to workings.
6. Repair and assembly shops in or near workings.
7. Training of maintenance men, operators and bosses.
8. Proper tools.
9. Regular overhauling.
10. Use of subassemblies to facilitate overhauling and keeping equipment in good condition.
11. Correct lubricants.
12. Good lubricating equipment and methods.
13. Heat-resistant electrical insulations.
14. High-strength, light-weight, corrosion- and abrasion-resisting metals.

and-button conveyors, power wrenches for other shop uses, belt vulcanizers, rollers, pullers, electronic testing equipment, lathes, pump testers, special drill testers, steam cleaners, electrical testing instruments, metal-cutting band saws, drill presses, oscillographs for ignition, dynamic-balancing machines, baking ovens, washing machines for removing grease, rail punches to eliminate rail drilling, etc.

EFFICIENCY IN METHODS

Regular overhauling and keeping machines in condition with subassemblies reduce maintenance and increase working time.

Spare equipment units facilitate overhauling at the majority of the "Coal-for-Victory" mines using loading machines. Overhauling schedules vary but the majority are on a time basis. A few operators, however, make overhauls on a condition or tonnage basis—such as 400,000 tons loaded at one operation. In one case, overhaul interval for loaders is four months. In another, the schedule for cutters is six months. Generally, however, the interval is 12 to 18 months, with some as long as 36.

Usually, the interval between overhauls is fixed by number of machines and shop facilities, which generally give a 12- to 18-months' schedule. In other words, the routine at many operations is pull a machine in as soon as the one in the shop is completed—usually 18 to 30 days—longer in a few cases. Two spares, the custom at a number of properties, permits keeping one ready for service while another is going through the rebuilding process. Subassemblies are employed at a number of properties for installation as required to keep machines in good condition and ease the overhauling problem.

Repair hints reported by "Coal-for-Victory" mines include the following:

1. Installation of spline-type foot shafts on crawler loaders to greatly reduce delays.

2. High-tensile steel bumpers on mine cars; reinforcement with steel strips.

3. Stainless-steel bottoms for loader-head conveyors.

4. Setting of clutches on loaders with ammeter for greatly reduced maintenance. Machines checked regularly and if readings are high the clutch is immediately gone into.

5. Locomotive maintenance greatly reduced, along with delays, by completion of a three-year program involving sending out all field frames to be rebuilt to standard and improving axle boxes by replacing two separate boxes and caps with one long bearing.

LUBRICATION FOR LOW COST

Good lubricants and good lubrication hold both mechanical and electrical failures to a minimum.

Both lubricants and lubricating methods have received considerable study at "Coal-for-Victory" mines, to determine both the types best suited to the duties and the methods of applying them with efficiency and cleanliness. A number of properties made changes in lubricant types, either as a result of their own investigations or studies by oil-company lubrication engineers, who make regular checks to determine results and make recommendations for more efficient application.

Revisions at some operations included such things as reducing from 8 or 10 grades to two, including hydraulic oil—used for certain lubricating applications. Labor in handling was cut at least 50 percent. A change from a black to a high-quality grease at another operation resulted in a material decrease in maintenance—to one-tenth on car wheels, for example. In one instance, lubrication was eliminated entirely by redesigning the tail sections of conveyors to use graphite-bronze sleeve bearings. Delays were materially reduced. With the original open-type sleeve bearing, lubrication often enough to prevent rapid wear was difficult.

While operators still handle all the lubrication at some mines and part at others, the tendency at "Coal-for-Victory" mines was in the direction of having it done by mechanics, electricians or special greasers. At one operation, where machine runners still handle lubrication, the electrician or his helper each morning fills special containers with the correct lubricant for the machine used by each man. An immediate result was a reduction in armature failures on locomotives because the containers did not hold enough to permit "flooding." Since armatures constitute a special problem, some mines follow the practice of having them lubricated by the electricians or special greasers, leaving the mechanical bearings to the operators. A variation is greasers for all equipment except cutters and a separate man for the tipple.

Greasing sometimes is coupled with minor repairing. In some cases where specialists are employed, special transporting equipment and greasing trucks also are used. At one mine, a tank truck delivers lubricants to the sections, keeping them clean and reducing spillage. Greasers lubricate, check condition of the machine and make out a report. A central lubricating system has been installed in the tipple at this operation.

A lubricating truck with a tender is employed to lubricate cutters and loaders twice in 24 hours at another property. There is no oil storage underground at this mine and the greasers also take care of bringing machines out for weekly inspections. Purchase of a special lubricating truck was credited with reducing maintenance materially at another mine by making sure that each bearing was flushed and greased. Two hoses permit the machine operator to help, truck visits each machine daily.

Mine-car lubrication was facilitated at one operation by a tank on the surface and a pipe to the lubricating station on the bottom. This operation also went to a new-type pressure gun for cars. Locomotive lubrication was improved at another property by changing from grease to oil fed by wicks from small tanks.

Grease fittings were removed at one mine and replaced with ¼-in. pipe plugs. A hose with a ¼-in. pipe nozzle is screwed on for greasing and a high-capacity gun flushes all bearings. This system uses lots of grease, the operator reports, but bearing replacement has been cut to practically nothing.

Reduction of bearing failures to practically none followed the installation about two years ago of a centralized automatic lubricating system serving all but four bearings on loading machines at one mine. The same equipment is planned for the track cutters and will be 100 percent in the preparation plant. Contrasted to numerous failures previously, no bearings have been lost on the loaders since the system was installed.

MATERIALS FOR LONG LIFE

Maintenance is reduced and breakdowns decreased by use of corrosion-, abrasion-, flame- and heat-resisting materials.

Use of heat-resisting wiring has been widespread for a number of years and "Coal-for-Victory" mines are no exception. Many of them now report satisfaction with glass insulation, high-temperature varnishes, hot-pressed mica slot troughs, asbestos varnished paper and other newer insulating products.

In the field of metals, corrosion- and abrasion-resisting applications in pumping already have been discussed in a previous section. Other applications include stainless steel for shakers and chutes in tipple; stainless and manganese for conveyor bottoms, including loading-machine front ends; light-weight high-tensile corrosion-resisting alloys for cars and preparation applications; hard-surfacing and tough wear-resisting alloys for wearing strips in loader and other chains; high-strength alloy shafts and axles for armature and other applications including pumps; hard surfacing of teeth in roll crushers and hammers in hammer mills; and so on.

SUPPLY SERVICE For Efficient Handling

KEEPING TRACK OF SUPPLIES reduces waste, handling them efficiently reduces labor, and having them at the right place at the right time saves loss of time in the vital operation in mining—loading. Appreciation of these facts underlies a number of practices and changes in methods at "Coal-for-Victory" mines.

RECEIVING AND STORING

Special facilities conserve manpower in receiving and storing parts and materials. Good records reduce inventories and losses.

New storage facilities have been installed, along with improved record systems, at a number of "Coal-for-Victory" mines and are planned for others. A trend to centralization characterized operations at these properties, although there was a tendency in the opposite direction at a few. One company completed centralization for three mines in 1945 and supplemented perpetual inventory with physical checks at three-month intervals to eliminate overstocking and dead items. As a result, inventory was cut from $60,000 to $50,000.

A new building at another property eliminated two old buildings and centralized supply handling. With a new repair car carrying parts, this move is expected to reduce quantity kept in working sections. At another property, served from a main storage source, the supply house was moved about one mile underground for greater convenience. A new supply house at still another property reduced labor in receiving trucked-in items and afforded better protection. For greater convenience, another operation retained the old supply house for bulk items bought in large lots and built a new house for issuance near the shop and office on the hill at the mine portal.

New powder and oil houses went in at numerous "Coal-for-Victory" mines for greater convenience and fire protection. At one property, the powder house was made large enough to take a full car, saving $50 a car on the cost. Tanks for carload oil deliveries were put in at another property. Tanks were placed underground at another.

Perpetual inventories are used at the majority of the "Coal-for-Victory" mines, with some using the book-type system for greater convenience.

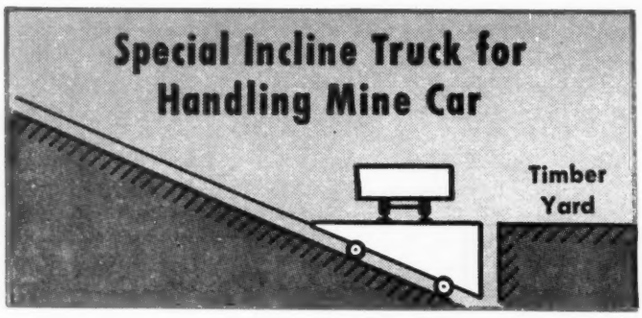
Facilities installed to ease receiving and handling supplies include: (1) overhead cranes; (2) a loading platform at car height onto which trucks discharge timbers sideways, so they can be moved to mine trucks by sliding them on rails; (3) two gas yard locomotives, mono-rail crane in storeroom, special bin (20 tons) for sand and gravel (received mixed), and a sand borehole to which trucks dump directly; (4) special hoists for material and parts handling, etc.

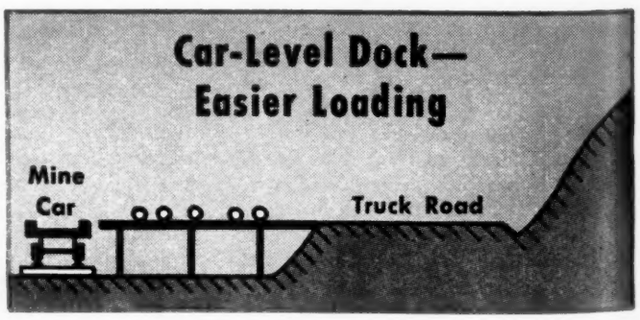
DELIVERING WITH EFFICIENCY

Good delivery schedules and equipment and small-parts stocks at working sections prevent production delays.

Practically all the "Coal-for-Victory" mines maintain parts stocks in or near working sections. These normally consist of small frequently used items, such as hydraulic hoses, cap screws, bearings, machine ropes, contactors, etc. This is in addition to subassemblies for machines often kept at underground repair shops. At one mine with conveyor haulage and shuttle cars, motors, speed reducers, gearmotors, hydraulic pumps and head and tail sections for loaders are kept in or near working sections.

At mines using track haulage, an increasing number were employing special trucks for delivering materials and parts. Examples include: (1) a three-compartment lubricant car (grease, oil and hydraulic oil); (2) special ballast car with a capacity of 12 to 15 tons with special gate for spreading the gravel used; (3) combination oil and bit car to reduce number of special cars in service; (4) special car for powder and dummies (42 50-lb. cases of powder and 11,000 to 12,000 2x16-in. dummies); (5) special trucks for moving heavy parts, materials and machine subassemblies; (6) special powder cars and day-supply magazines (brick with steel doors) in sections, etc. At one property with an outside incline, a special truck accommodates a mine car and is lowered into a pit to receive timber, as shown in an accompanying illustration.





Special trucks for underground supply service, users report, save labor and are safer in loading and unloading as compared to cars. They also are less subject to derailments and other troubles in transportation.

For moving equipment, in addition to trucks already mentioned, one mine uses an underslung truck for conveyor drives. Another had ordered three 15-ton cars with beds 10 in. above the rail for moving supplies, loading machines and the like. A third employs three crawler-type tractors to skid conveyor drives to the supply track and for loading on trucks. The tractors have a rated pull of 7,000 lb., while skidding a drive on the bottom requires 6,000.

Moving of chain-conveyor drives was cut 75 percent at one operation by equipping them with detachable wheels and tires or integral winches. The winch and skid, experience has shown, is the more suitable. A special rubber-tired cable-reel truck is employed to deliver supplies in working places. With belt transportation, this mine operates a 1-ton locomotive pulling a special 42-in.-gage trailer car 14 ft. long and 6 in. high above the floor on a track paralleling the belts for both materials and men. Two loading shifts are worked.

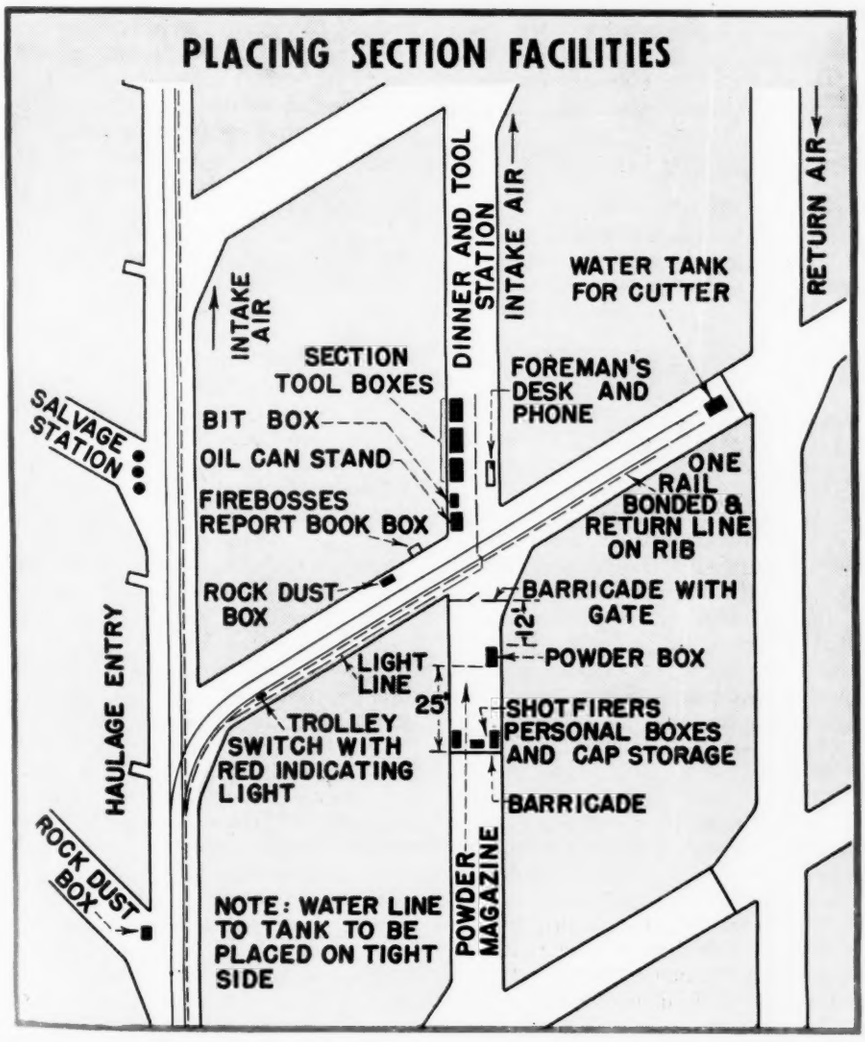
At "Coal-for-Victory" mines with main-line conveyors, the tendency apparently is toward paralleling them with tracks for convenience in handling supplies. Getting supplies to the face offers special problems at conveyor mines. Some use dollies in pan lines, others, as previously noted, special trucks. At one, the operating schedule was changed from three to two shifts. Supplies are now delivered over the belt on the off-shift. The change was credited with a substantial increase in efficiency at this mining property.

A change from supplying on the shift to the third shift also helped materially at another operation. The supply crew places all pans, chains, carbon-dioxide tubes, timber and other supplies in the rooms, thus rendering it unnecessary for production crews to stop loading to move materials.

Spillage and waste in handling oil cans resulted in changes in equipment at several properties. One supplied new cans with improved spouts to reduce leakage. Another made special containers that require caps being kept on, thereby reducing waste about 20 percent. The containers consist of lengths of 8-in. steel pipe 10 in. long with welded-in ends. A 1-in. pipe plug with cap is put on the side near one end. In the end is a ¼-in. plug.

BETTER SUPPLY SERVICE

1. Truck- and railroad-height ramps for unloading and loading into mine cars or mine trucks.
2. Convenient storage racks or platforms with monorail cranes, hoists and other facilities for handling by power.
3. Automatic or semi-automatic sand-handling equipment, including boreholes.
4. Convenient, well-arranged supply houses close to workings and equipped with labor-saving equipment.
5. Good record systems.
6. Fireproof powder and oil houses, latter with chain blocks, working-height racks and other labor-saving facilities.
7. Special oil cars and containers to prevent contamination and reduce spillage.
8. Special powder cars and safe underground magazines.
9. Special trucks for handling materials, machines and parts.
10. Special hoists, winches or pulling devices for moving conveyor drives and other equipment.
11. Special supply carriers for trackless or conveyor places.
12. Parts stocks in working sections.



SAFETY
For Better Coal Mining

ALONG WITH increases in tonnage and individual productivity, the majority of the "Coal-for-Victory" mines made substantial progress in eliminating injuries and fatalities. There were, of course, some exceptions but these were in the minority. Fatality rates of one-half or one-third the national average were not infrequent, while tons per lost-time injury in many cases ran well ahead of the average.

One highly mechanized property, for example, reported shipments of 2,749,250 tons (25 percent reject in preparation) without a fatality between Oct. 8, 1943, and May 27, 1945. Counting the one fatal, production from Oct. 8, 1943 to Dec. 31, 1945 was 3,860,177 tons. Another operation using conveyors had its last fatality in May, 1940, and before that had operated ten years without a death. The last fatality at one hand-loading mine was in April, 1943—the first in 16 years.

The connection between increased tons per man and greater safety is once more strikingly shown by results achieved at "Coal-for-Victory" mines. Some typical examples are illustrated in the accompanying chart comparing tons per man with tons per lost-time injury.

Organizing for Safety

Management backing, full-time safety supervisors, good accident records, trained bosses, constant selling, enlistment of employee cooperation, education in safe methods, adoption of safe working standards, awards for achievement and good provisions for taking care of injured men are among the foundations of safety progress.

Active participation by top management keynotes safety work at "Coal-for-Victory" mines. Evidence of its desire for greater safety is reflected in the substantial increase in number of safety engineers, directors and inspectors added to payrolls in the past two or three years. Thus a majority of the companies now have full-time safety supervisors and, frequently, supervisors are employed for each operation. Occasionally, engineering is combined with safety work and, exemplifying the connection between production and safety, the superintendent acts as the director of safety at some properties.

Improvement in record-keeping has marked safety progress at "Coal-for-Victory" mines and occasionally has some interesting sidelights. At one operation, for example, better record-keeping, showing all injuries, apparently resulted in an increase in number of lost-time injuries, whereas, as a matter of fact, operations were being made safer as reflected in declining compensation cost. At another property accident reports were combined with the daily tonnage report compiled by the dispatcher and showing the rating of the various foremen in both safety and production performance.

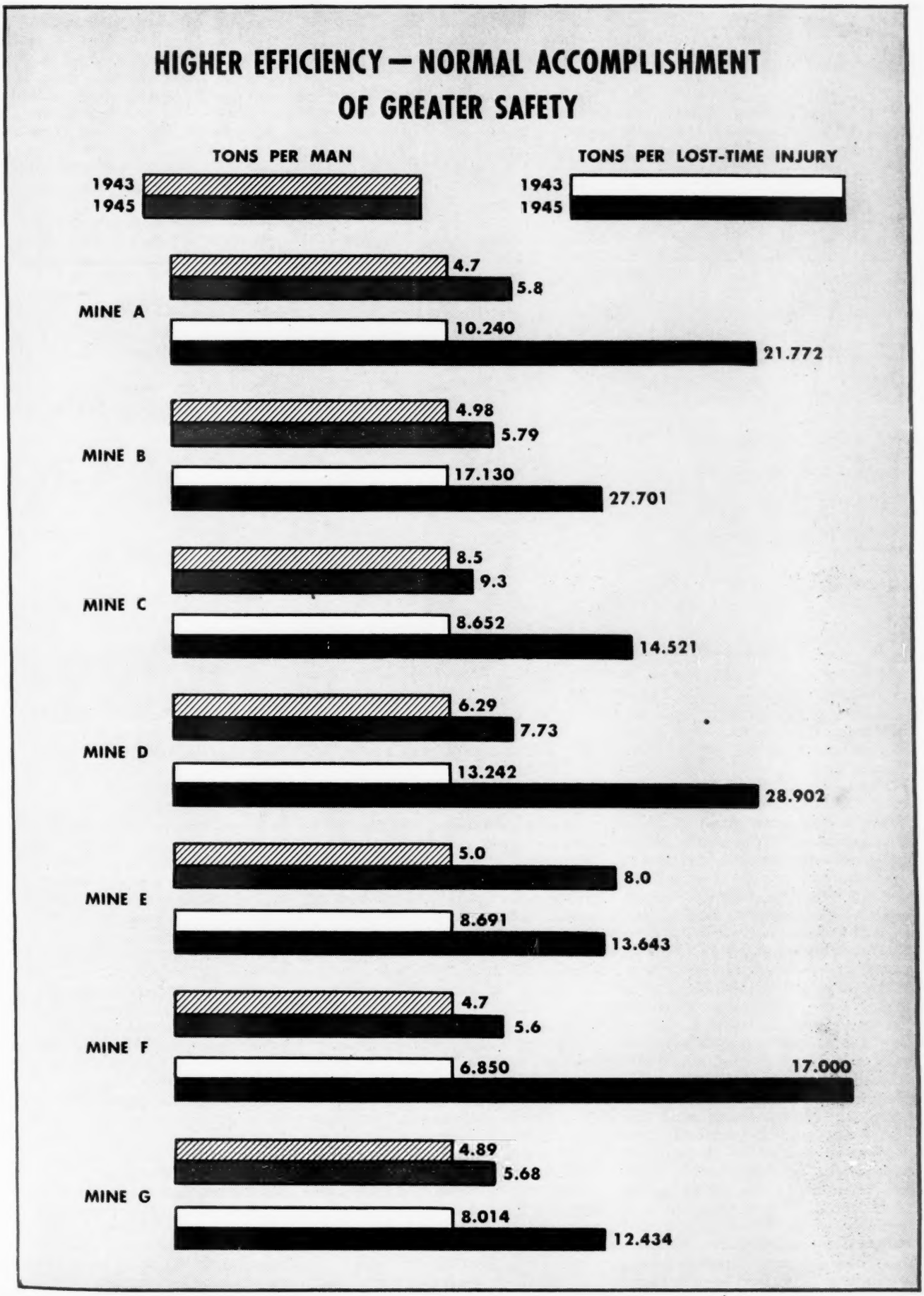
Since the supervisor on the ground necessarily is the key figure in safety work, practically all "Coal-for-Victory" mines make provision for helping him do his part better. Training is one step and includes first-aid and mine rescue in the majority of cases, as well as courses in accident prevention given by the company or by federal, State or university experts, assisted by published material of various types. In addition, continuous instruction in accident prevention and safety problems is the responsibility of the general mine foreman or superintendent at a number of properties.

Where continuous training and instruction is the rule, meetings sometimes are less frequent. In the large majority of cases, however, meetings of foremen and supervisors are mainstays in safety work. Usually, these are held once a month—normally at the mine but in some cases in the evening at an eating and meeting place. A fair number of companies, however, have meetings once a week—oftener in a few cases—between foremen and the safety director or superintendent, or both, to discuss specific injuries and accident-prevention progress in general. In a few instances, meetings are daily and at certain properties the safety director meets with the bosses on the ground—in other words, in the mine.

Other variations in meeting arrangements include once a week at one company, supplemented by quarterly meetings and parties, at which the bosses are given prizes. The schedule of another company is set up on the basis of meetings between foremen and men once a month, supervisors with their foremen once a month and general superintendent with all supervisors and foremen every three months, topped off by an annual party at which the leading mine gets the trophy for the best record.

General or local meetings with employees apparently are being set up at more and more "Coal-for-Victory" mines. These range from general rallies to get-togethers in the working sections. Frequently they are the occasions for making awards and, at a number of properties, may be strictly impromptu—called when a crew or mine excels its previous record and ranging from beer busts to more formal dinner gatherings. Or, prizes of clothing, groceries, home appliances, cigars and other merchandise may be given without formal ceremony, either on a regular or as-when basis. Attendance prizes occasionally are offered to get men to come out to regular monthly safety meetings.

One company holds a general safety meeting every six months, at which men with no lost-time injuries can draw


HIGHER EFFICIENCY — NORMAL ACCOMPLISHMENT OF GREATER SAFETY
TONS PER MAN
1943
1945
TONS PER LOST-TIME INJURY
1943
1945
MINE A
4.7
5.8
10.240
21.772
MINE B
4.98
5.79
17.130
27.701
MINE C
8.5
9.3
8.652
14.521
MINE D
6.29
7.73
13.242
28.902
MINE E
5.0
8.0
8.691
13.643
MINE F
4.7
5.6
6.850
17.000
MINE G
4.89
5.68
8.014
12.434

lots for such things as automobiles (first prize) on down. Monthly drawings also are held at mines without lost-time injuries, with prizes to both men and foremen. Other properties reward good records by bosses with such things as a $50 bond monthly to the high man, insurance policies for annual periods without accidents and so on.

Other incentives include special buttons to men for one to five years of work without injury—a different button each year and, at the end of five years, a cash award—and, at some properties, election of bosses to special safety clubs, with or without privilege of insurance or other tangible awards.

Meetings Promote Safety

The benefits derived from meetings between supervisors and men are considered by several operators to be sufficiently worth while to warrant paying for them. This may be done indirectly or directly. Under the indirect plan, work is stopped at intervals to permit meetings to be held between men and bosses in their regular working sections. Usually, this is done once a week; in other cases, once a month or other schedule. One-half hour every Monday is the rule at one property. Another operation holds monthly meetings and pays men for attending. At these meetings men involved in accidents must explain and particular accidents and safety in general are discussed.

Competition between supervisors and between sections and teams of men also is stimulated by awards, posting of records, printing them in company publications and charting them for mailing to bosses. The indicating bulletin-board is a familiar sight at "Coal-for-Victory" mines. These boards also are widely used for general safety information, posting of results of accident investigations and other educational material, which frequently is supplemented by mail messages to homes in addition to company newspapers. Careful investigation of major injuries, incidentally, is the rule at many mines, and the findings and ensuing discussions and recommendations have been found very helpful in preventing repetitions in subsequent periods.

Safety rules and standards are other educational measures that have been found quite effective by companies that have had them for several years, as well as the growing list of operations now adopting or adding to them. Several organizations are taking special steps to print and bind these rules and standards so that they may be carried and used easily, especially by supervisors, although men as well are urged or required to read and know them. With rules and standards down in black and white there is less excuse for violations and more of an incentive to observance.

To help develop adequate standards and to promote safer operation, several mines have set up joint management-miner committees and others are asking the men to help in their formation. Among other things, these committees make regular reports—weekly, every two weeks or monthly in most cases—which serve as the basis for changes in rules, adoption of new standards and correction of hazardous conditions. Suggestions for improving safety are solicited by some operators, with cash awards for those approved by safety boards. Another operator couples suggestions with removal of a man's name from the injury list where it otherwise is posted for one year. If the man makes an acceptable suggestion, he can get his name taken off without waiting the full twelve months.

Comprehensive courses in accident prevention also are offered employees at a few properties. Most, however, rely on instruction by supervisors and safety inspectors. First-aid is the major exception and most mines have 100 percent as the goal, although hampered in reaching it by war conditions and payment considerations.

While first-aid for everybody is the goal because of the opportunity it also provides for selling safety, a number of mines are adopting special provisions for handling injured men. One company, for example, adopted four years ago the practice of not moving an injured man, unless in a dangerous place, until he is visited by a doctor and removal can be supervised without further hurting him in handling, as is sometimes the case when men not familiar with the job do it.

Additions to first-aid stations and handling equipment at a number of mines included improved stretcher equipment and special ambulance cars—usually inclosed, heated and equipped with special springs and drawbars. One new car takes a regular ambulance cot so that once the man is picked up he need not be disturbed until he reaches the hospital. New type first-aid stations included one knockdown type that two men can move 400 to 500 ft. and re-erect in an hour.

Facilities for the administration of blood plasma by the doctor have been installed at several "Coal-for-Victory" mines.

Eliminating Hazards

Good physical, mechanical and electrical conditions, removal of gas and dust hazards, ample escapeways, protection against roof falls, fire prevention and protective clothing enhance safety.

Hazard elimination at "Coal-for-Victory" mines proceeds hand-in-hand with adoption of increased facilities for personal protection. Thus, these properties are practically 100 percent on the hard-hat and shoe basis. Goggles are compulsory at a number and their use is increasing at others, although the plastic visor or face shield is reported by some as more convenient and thus more likely to be used. Gloves are being pushed at several properties, along with special protective equipment for men working with electrical systems and equipment. Personal protection also includes growing use of such things as respirators and self-rescuers. In the case of the latter, some mines, to avoid complaints about wearing them, have supplies spotted at strategic points in every working section. Elastic leg bands are furnished by at least one operation and a number are working toward having all men tie, tape or clip trousers and otherwise get away from loose clothing.

Better housekeeping, increased use of guards and better storage and handling facilities characterize hazard elimination or reduction at "Coal-for-Victory" mines. Facilities for oil and explosives have been the particular targets for improvement, as reflected in the many new storage buildings on the surface, new safe trucks and cars for transportation and new, safe and fireproof magazines and oil houses underground.

The emphasis on housekeeping and improved physical conditions also is reflected in wide-scale haulage reconstruction in late years, as summarized in a previous section in this issue. Examples specifically reported as having a considerable bearing on safety include: (1) relaying of track and better timbering on haulways; (2) new man-trip cars (comfortable, roofed and otherwise designed to eliminate or reduce hazards in derailment and exposure to roof falls and bare wires); improved timbering (hitch-drill system); dispatcher control; concreting switches from rib to rib; limitation of trip size; braces on switches and curves; quality track standards (heavy rail, good subgrade, gravel ballast and treated ties); and good maintenance (two men on switches and two on main-line track daily); (3) better track and clearances. Car stops,

blocks and derails are widely used for prevention of runways.

One operation installing new man-trip cars provided a caboose and tool car at each end. Improvements in regular rolling stock for greater safety included such things as rounded corners and automatic couplers on cars to reduce coupling injuries; rebuilding of locomotives to make them safer and provide ample protected quarters for both motormen and tripriders; development of a new-type trip drag with a hinge permitting more nearly positive engagement between the ties; and equipping old and new slope hoists with dynamic braking.

A major increase in grounding of both stationary and portable equipment marked advances in electrical safety at "Coal-for-Victory" mines, along with more effective guarding and use of insulating mats, platforms and operating handles. Non-inflammable and dry-type transformers increased, along with sectionalizing underground to reduce fire hazards. One operation, as noted previously in this issue, went to the practice of installing separate insulated wires into working places and then using a short 40-ft. cable to face equipment to cut down cable fires. Vulcanizing to keep cables in better condition showed a substantial rise.

CUTTING ACCIDENT COST

1. Management participation and backing.
2. Good records of accidents, their causes and costs.
3. Strong, well-staffed safety organizations.
4. Standards for safe operation.
5. Training of bosses and men in safety work.
6. Regular get-togethers on safety for supervisors and supervisors and men.
7. Thorough accident investigation.
8. Continuous selling of the safety idea and safety methods.
9. Use of competition and incentives.
10. Enlistment of employee cooperation.
11. First-aid training and good facilities for handling and transporting injured men.
12. Use of protective clothing and devices.
13. Good housekeeping.
14. Elimination of mechanical, electrical and other hazards.
15. Safe haulage equipment and methods.
16. Good man-trip cars.
17. Better ventilation.
18. Permissible equipment and materials.
19. Rock dusting and sprinkling.
20. Good fire prevention and fire-fighting facilities.
21. Safe facilities for storing and handling explosives, oil and inflammable materials.
22. Ample escapeways.
23. Complete guarding of equipment and hazardous areas.
24. Efficient sounding and inspection of top conditions.
25. Good permanent and temporary timbering in accordance with standard plans.

Better Air Provided

Better ventilation—the rule at the majority of "Coal-for-Victory" mines, as summarized in a preceding section, is a first line of defense against gas and dust ignitions. Improvements made also included more and better sealing of worked-out areas and—in the other direction—changes in air coursing to better sweep seals or clean out old workings. Improved methods of getting air to the face, including line brattices, checks, stoppings and the like, were adopted at numerous properties. Steps to better air circulation and protection against interruptions included cleaning up airways and installing permanent timbering, with some operators taking down and loading as much as 15 ft. or more of material to get to good top and thus make it easier to maintain good airway condition. These steps also markedly reduced labor in cleaning up. Splitting to every room panel—a growing practice—also is doing its part to get better air at the face.

To supplement other work in the prevention of ignitions, practically all mines are specifying that all new underground equipment be permissible, along with permissible powder and other facilities. In addition to a number of operations now completely permissible, many others were working to that goal in the near future in addition to concentrating on keeping units in service in permissible condition at all times.

Rock dusting ranks first in measures taken at "Coal-for-Victory" mines to reduce the coal-dust hazard. Numerous purchases of new high-pressure rock-dusting machines—some with hoses as long as 500 ft.—were reported, along with installation of portable units for getting into airways and other less-accessible places. Hand-dusting in rooms between machine applications was reported by several operations.

Quantities of rock dust being applied also have been going up, one mine reporting that the average is 9½ lb. per ton shipped, at a cost of 5c. per ton. Closed panels are now the rule at this property. While working and until they can be sealed, these panels are provided with barriers consisting of paraffined sacks of rock dust with wire tears. Dust use has increased four times at another property.

A major increase in water for allaying dust is reported by "Coal-for-Victory" mines. A number have completed or are installing pipeline systems into every working place. Others combine pipe systems with water tanks on cutting machines or on trailers accompanying such units. Where complete piping systems are installed an opportunity also is afforded for spraying during drilling and for wetting down the coal before and after shooting, in addition to the use of water during cutting. Several operators add chemicals to increase the wetting power of water and reduce the quantity necessary. A greater number, however, rely solely on water.

In a few instances local pipeline systems are supplied with water from tank trucks at strategic points in the sections to feed cutters, sprinklers and sprays at elevator or conveyor heads. Getting water is somewhat of a problem at certain properties. The solution at one was a borehole drawing from the strata and discharging into a sump made by erecting dams underground.

Use of water on the cutter-bars and at conveyor or elevator heads or transfer points is the commonest type of application. Extensions include stations for

spraying empty and loaded trips, facilities for spraying during drilling and washing out drillholes, sprinkling of shot-down coal and so on up to complete application at the maximum number of points such as, at one property, the cutter-bar, fresh-shot fall, pan-line, conveyor-belt and car-loading stations and slope bottom. Tanks used with cutters have capacities up to 1,500 gal., or enough for 24 hours of operation, depending upon spraying practice. One operation has found that the most efficient nozzle for cutters is a standard grease fitting with the "innards" removed. Pressure at this and a number of other operations is 60 lb. per square inch.

Calcium chloride on roads is a common and effective dust-allaying practice where shuttle cars are employed. Several mines, however, wash the roads down with water from the sprinkling system.

Reducing Fire Hazard

Fire prevention and fire fighting have been the subject of a great deal of work at "Coal-for-Victory" mines. Steps taken in these directions include:

1. Fireproof construction underground—stoppings, substation rooms, oil and powder magazines, etc. One operator, for example, puts an insulating top in its substations 4 in. down from the roof. Another company has rebuilt fan drifts to make them fireproof, and one mine replaced timber with steel at portals.

2. Sectionalizing, non-inflammable transformers and other electrical safeguards, as outlined earlier in this section.

3. Use of permissible explosives and blasting devices.

4. Much wider use of fire trucks of the water and chemical type. Most water cars are equipped with high-pressure pumps. One mine, however, uses nitrogen cylinders with a hand pump in reserve and accompanies the fire units with supply trucks containing materials for bratticing, building stoppings and other operations. A welding car with water tank also is available at the property, and it is planned to install hand pumps on the tank trucks for cutters for fire fighting.

5. Hand and portable chemical, powder and carbon-dioxide extinguishers on equipment and at critical points throughout the workings.

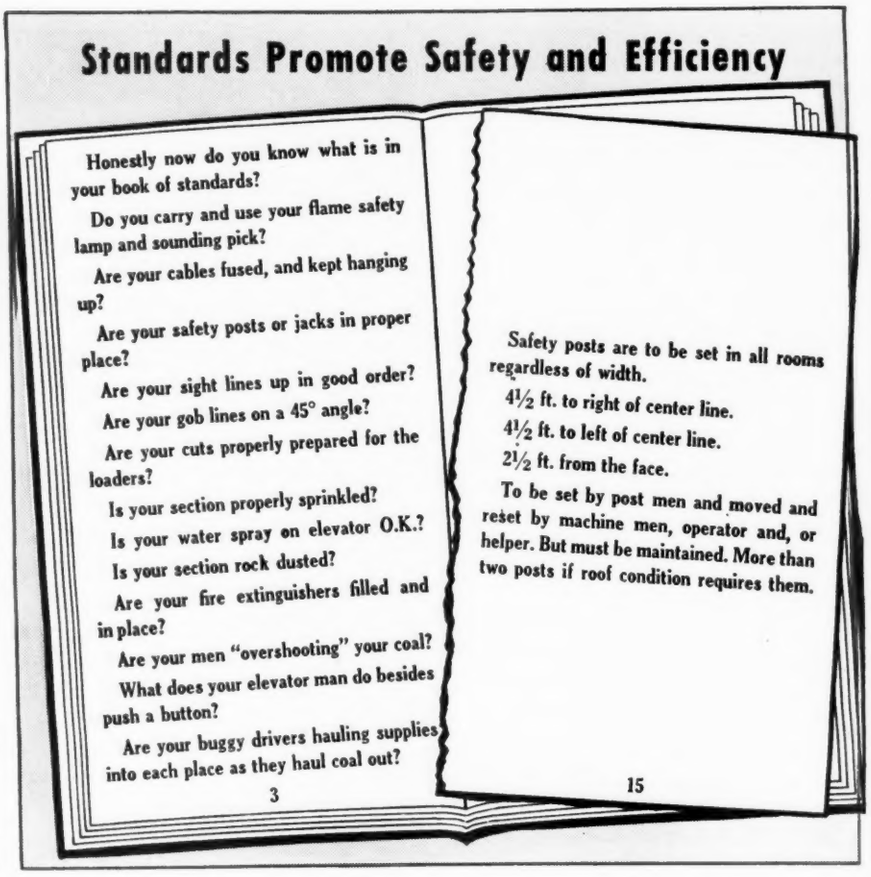
6. Supplies of rock dust at strategic points throughout the mine and especially at points where the presence of electrical or other equipment might increase the hazard of ignition. Many operators look on rock dust as perhaps the best means of fighting fires, either applied by hand to small fires just starting or by rock-dusting machines if one should get going, since rock dust both cools and cuts off air. One mine has a special machine with 400 bags of dust that can be use in case a fire occurs.

7. Pipelines with outlets for hose at intervals. Outlets are made every 500 ft. at one operation and posters are put up to show their location. At another, the interval is 400 ft. At still another, 3-in. hoses and nozzles are being installed at 50-ft. intervals. The interval for fire-fighting outlets is 1,000 ft. at another property.

In case trouble is encountered, however, numerous "Coal-for-Victory" mines have provided additional shafts, slopes and drifts at the back of the properties and at other strategic spots to make it easier to get men out. Installation of new openings also has been paralleled by a great deal of work underground to provide additional headings or other openings for escape, including permanent ones timbered and maintained accordingly. A few operators have gone to cutting places through to developed areas up the pitch or otherwise to provide additional exits. Several properties now drive special entries for bleeder and escape purposes into which room-panel entries are cut as soon as they are driven up ready for operation.

Falls of roof, however, are the big hazard at "Coal-for-Victory" as well as other mines. Remedial measures include better inspection and sounding of roof and better permanent and safety timbering. Some of the plans employed are shown in other sections in this issue, but in general they rest on standardization and use of a specified minimum number of supports permanently down the room and temporarily at the face. Types of supports include bars, posts and jacks.

Inspection, sounding and taking down loose material naturally are essential parts of a system for maximum protection against roof falls. Better sounding done more often is the rule. Many mines require it at least every time a man enters a place and every time he is visited while at work. Others require it at intervals throughout the day—in some cases every half hour. These regulations are paralleled by training in proper methods and use of equipment better calculated to ascertain top condition. Consequently, special sounding bars are being supplied foremen at an increasing number of properties. One is made with a wedge at one end and a knob at the other. Another is fabricated from old shaker-conveyor rollers with rubber handles. The weight is sufficient to really vibrate the top.


Standards Promote Safety and Efficiency
Honestly now do you know what is in your book of standards?
Do you carry and use your flame safety lamp and sounding pick?
Are your cables fused, and kept hanging up?
Are your safety posts or jacks in proper place?
Are your sight lines up in good order?
Are your gob lines on a 45° angle?
Are your cuts properly prepared for the loaders?
Is your section properly sprinkled?
Is your water spray on elevator O.K.?
Is your section rock dusted?
Are your fire extinguishers filled and in place?
Are your men "overshooting" your coal?
What does your elevator man do besides push a button?
Are your buggy drivers hauling supplies into each place as they haul coal out?
3
Safety posts are to be set in all rooms regardless of width.
4½ ft. to right of center line.
4½ ft. to left of center line.
2½ ft. from the face.
To be set by post men and moved and reset by machine men, operator and, or helper. But must be maintained. More than two posts if roof condition requires them.
15

EFFICIENT STRIPPING

With Modern Equipment and Methods

ADVANCES IN EFFICIENCY at "Coal-for-Victory" strip mines, as indicated in the article beginning on p. 90 of this issue, are a product of management efforts in two major directions:

1. Use of larger equipment more suited to the job.

2. Increasing operating time and productivity by more efficient conduct of drainage, overburden preparation, stripping, loading, haulage, power, maintenance and related activities.

DRAINAGE FOR EFFICIENCY

Efficient water handling prevents interference with pit operations and increases productivity.

Keeping water out of the pit and handling it by gravity is the first step to low drainage cost and higher efficiency at "Coal-for-Victory" strip mines. Ditching on the highwall therefore is common practice, the general plan varying with different properties and different conditions. At some mines, ditches are kept as close to the pit as possible to reduce the space from which water can run off into the workings. Another puts the main ditch beyond the recovery line and runs laterals to it about every 250 ft. Still another keeps main ditches an average of ¼ mile away with laterals to them every ⅛ mile. Some pits in hilly country make special provisions—dams, drainways and the like—for handling extra-heavy rainfalls. In one case, the highwall is ditched so that all the water enters the pit at one point and drains off through the spoil bank.

While some pits are made self draining through ditches, an increasing number of operators have adopted the practice, particularly where the water can be discharged down hillsides, of leaving drainways open through the spoil or putting pipe drains through it at intervals. At one property, the drains are old 6-in. oil-well pipe laid from all low spots (six in the present pit).

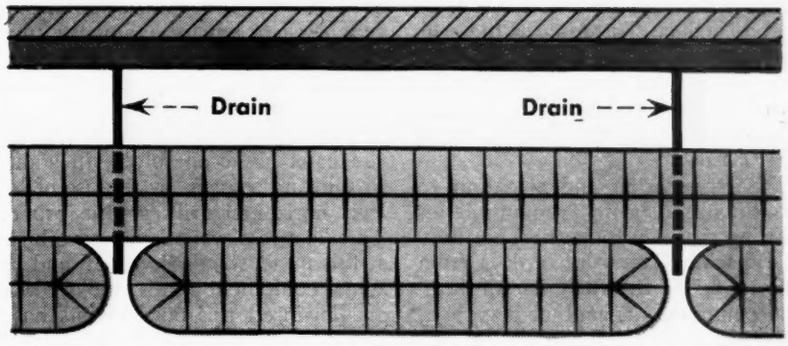
Practice at another property that has developed this system to a high degree of perfection is to leave open drainways in the spoil for the first cut and then lay pipe from every low spot and at not more than 600-ft. intervals elsewhere. Eight-inch junk pipe was first used but it was found that it would occasionally plug. Now, the mine buys 12-in. culled concrete pipe in 30-in. lengths for approximately the same price. Plugging has been largely eliminated. The pipe is put about 2½ ft. below the coal level by shooting out a ditch. A wagon drill puts down holes about 30 in. apart. The pipe then is laid and 4 to 5 ft. of dirt is bulldozed on it before the stripper passes. It also adds to the soft dirt covering. A plank is embedded in the coal about 3 in., so it cannot be displaced, to mark each line.

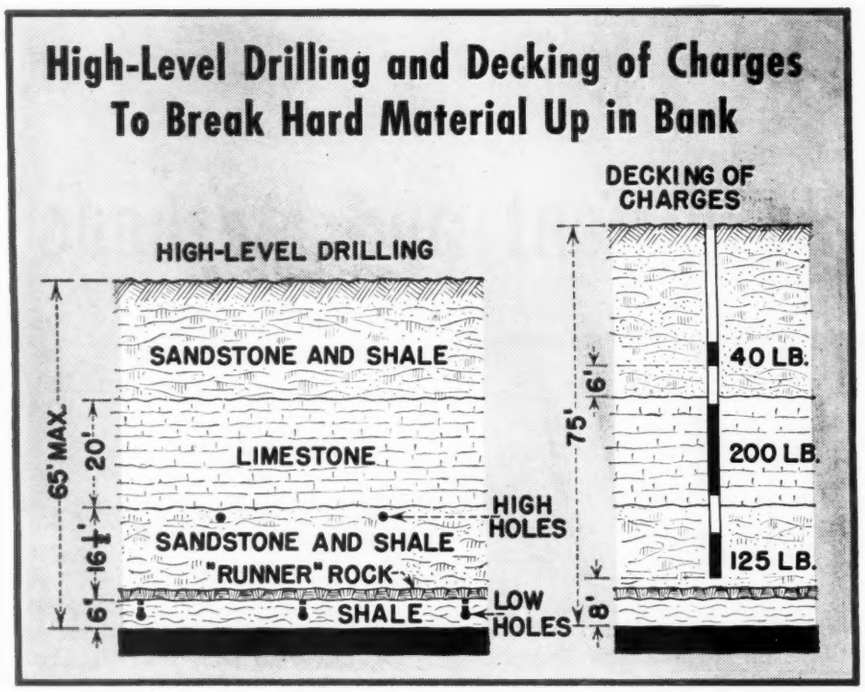
Pumps number about three 2- and 3-in. units (mostly gas) per pit at this property. Two utility pumps up to 6 in. in size are available for use as required, but for weeks at a time pumps never are employed. This reflects the efficacy of pipe drainage in dewatering the pits. Occasionally, water will be pumped over a knob into the pit on the other side so it can drain. Use of the pipe drains, officials report, also makes it unnecessary to build ditches or dams on the bank, reduces pumping and decreases the chances of being flooded out.

In the field of pumping equipment, the most numerous units are small portables frequently powered by gasoline engines. Main pumps—less numerous—run up to 10x10. Since these large-sized units normally are found at strippings using electric power, they frequently are equipped with electric motors. Splash-proof motors are growing in use and weatherproof controls are generally standard. Self-priming is the rule. Since the water normally is not particularly acid, most pumps are not specially fitted to resist corrosion, although a few are equipped with alloys.

Pipe normally is plain steel where steel is used, with a few operators applying cast or wrought iron for greater life. Hose discharges are frequent. In one instance an attempt is made to position hoses and increase length to get as much siphoning effect as possible, permitting pumps to handle two or three times as much water as otherwise.

Drains and Gravity Put Water Through Spoil Bank Without Pumps and Power





Overburden Preparation

Better drilling equipment, improvements in drilling patterns and study to get better explosives conserve manpower and make it easier for stripping equipment to handle more overburden with less power and maintenance.

Horizontal drills for overburden are in the majority at "Coal-for-Victory" strip mines. However, natural conditions dictate use of vertical equipment at some and a number employ both types depending upon conditions, including height of bank. In many instances, smaller units have been replaced by larger or power feeds have been substituted for manual to increase drilling speed and conserve manpower. One mine that replaced hand with hydraulic feed on a gas-powered horizontal drill reports an increase of 20 to 25 percent in footage per hour. Another bought a new unit which it mounted on a 1½-ton truck to get the holes 4 ft. higher to reduce shattering of the coal. As a byproduct, the new machine drills about 30 percent faster. New alloy-insert bits permitted putting in about six more holes (about 200 ft. more drilling) a day.

Better supervision and attention to the drilling problem was responsible for increasing monthly footage with a horizontal machine (one shift a day) from 7,500 to 8,500 ft. Redesign of horizontal equipment at another operation, making the units more suitable to conditions encountered, resulted in an increase of about 35 percent in footage. Equipping a horizontal drill with electric feed at still another property increased its capacity by 25 percent. Replacement of eight smaller vertical machines with seven larger units resulted in an increase in footage (9-in. hole) of from 42,000 to 46,000 per month at still another property.

Drilling units somewhat different from those usually employed includes three wagon-type units at one property. These machines are used for drilling a limestone ledge over the coal after the top has been removed by the dragline. Hole diameter is 1⅞ in. and in 4-ft. lime, which is about the average, the charge is 2½ lb. In 8-ft. lime, the charge is increased to 4½ lb. Holes are drilled on 4½-ft. centers. For highwall purposes, the mine employs a vertical auger drill making 5-in. holes. To supply the wagon drills, a large 500-c.f.m. compressor was purchased to replace one of the smaller units. It furnishes air to two drills and permits drilling about one-third more holes in a given time.

The problem of hard material up in the bank has been solved, in addition to splitting charges, by the use of high-level horizontal drills at one property. To take care of variations in overburden at this mine, standard vertical and horizontal equipment also is employed. Use of alloy-insert tips on drill bits has resulted in an increase of about 25 percent in footage per shift in addition to better ability to operate in hard material. With the high-level drills, the change to softer material resulted in practically doubling the drilling rate (from 180 to 350 ft.)

The present drilling plan, using a standard horizontal unit for low holes, angled up to get the charge as high above the coal as possible, in combination with the high-level equipment is shown in an accompanying illustration. When new horizontal drilling equipment is received, the bottom holes will be drilled above the "runner rock" for additional protection to the coal. Holes are spaced 35 to 40 ft. and charges are about 125 lb. of liquid oxygen in the bottom ones and 200 lb. in the top in banks up to 65 ft. maximum depth. In depths above 65 and up to 75 ft. or slightly more, vertical drilling and decking of charges is used as shown in the illustration previously mentioned. Hole spacing is 25 ft. on inside and 30 ft. on outside curves.

Diameter of horizontal holes was increased from 5 to 6 in. to get more concentration of the breaking medium at the back, especially in narrow work where shortness of the hole reduces the length of stemming than can be put in. Average depth of holes in deep banks is 35 to 40 ft.

One operation that increased size of hole to 9 in. several years ago to get better breaking effect in hard strata, particularly limestone, just over the coal has increased the equilateral-triangle spacing from 27 to 28 ft. All holes are tied into the engineers' survey and each one is entered under the name of the particular driller (vertical equipment). Each driller therefore is responsible for his own shots. In shale or slate, the holes are bottomed 2 to 3 ft. above the coal; in limestone, they are drilled to the coal. Charge is 9½ lb. of liquid oxygen per foot of hole in rock strata.

Bigger Holes Drilled

Diameter at another property, employing horizontal drilling units, was increased from 3½ to 6 in. and size of stick from 3½ to 5 for most work, although some 3½-in. powder (40-percent gelatin) is still employed where the extra breaking effect of the larger stick is not required.

Sidewall holes 30 ft. apart and 70 ft. deep at one mine, where the usual burden is 20 ft. of shale and 30 ft. of clay, are supplemented with holes drilled end-on along the bank in front of the shovel. The end-on holes, also 70 ft. deep, provide better breakage of the material along the bank line.

Production per pound of explosive, whether powder or liquid oxygen, runs up to 14 cu.yd. at "Coal-for-Victory"

strip mines. Several operations stress sizing up bank conditions and adjusting drilling and hole loading accordingly. One company using pellet and 40-percent gelatin raised output per pound to 11 cu.yd. in this fashion. Average production of the 20-cu.yd. stripping shovel at this property was 924.47 cu.yd. per hour in the latest year compiled.

Delay exploders are used by one company, which feels they are the coming thing. A series of three is employed—instantaneous, 0.006 second and 0.026 second. The jarring effect of blasting is materially reduced. This mine also uses a combination of stick and free-flowing dynamite. Holes are loaded with 3½x16-in. powder and, at the rock layers, this is supplemented with free-flowing. The latter fills the voids and results in better breaking of the limestone over the coal. The rock, it is reported, actually can be shot out into the open pit, leaving the dirt in place.

Stripping and Loading

Larger, better designed shovels with bigger dippers, supplemented by proper auxiliaries, increase productive efficiency.

From the standpoint of stripping and loading, "Coal-for-Victory" strip mines fall into two major classes: (1) those using equipment of 5 cu.yd. or less for stripping—usually powered by internal-combustion engines—and (2) those using larger stripping units—up to 35 cu.yd. or more. In both cases, steps have been taken to increase output of existing equipment at a number of properties by larger dippers or otherwise. In addition, a number of new and larger units have gone into service.

Average burden handled at properties using the smaller stripping units ranges from 20 to 40 ft. Maximum at these properties varies from 30 to 63 ft. Generally, from 50 to 80 percent is too hard to dig without shooting. At properties using the larger equipment, average figures range from 27 to 50 ft. Maximums run from 38 to 87 ft. Percentage of material too hard to dig without shooting generally is 50 to 80 percent, with one or two pits both above and below. At both types of operations, the maximum handled has been raised considerably at several mines either by re-equipping shovels, installing larger units or adopting draglines for helping out or doing the complete stripping job over part or all of the territory.

Shovel Re-equipped

Diesel engines supply the power for most of the smaller stripping units, such as the 1½- and 2½-cu.yd. shovels used by the contractor at one operation. They are accompanied by diesel tractors and bulldozers that push the spoil over the hill after the shovels have cast as far as they can. Another operator uses both a 1½-cu.yd. gas shovel and a 3-cu.yd. dragline to handle overburden up to 62 ft. Two bulldozers also are employed. The 3-cu.yd. diesel shovel at one plant was re-equipped by increasing stick length from 32 to 36 ft. and boom length from 43 to 50 ft. to carry a 4½-cu.yd. dipper. This permitted increasing output per hour from 250 to 300 cu.yd. and pit width 15 ft. It also eliminated double handling of spoil on inside curves. At this property, the plan is to increase maximum depth stripped from around 35 to 50 ft.

Two 2-cu.yd. diesel shovels used for both stripping and loading were supplemented by a 4-cu.yd. electric shovel with double Ward-Leonard control at another property in July, 1944. It permitted increasing depth of stripping about 7 ft. and raised production from the property. Maximum depth of cover is 55 ft. with some running up to 63 ft. The average ratio, however, is 5¾ to 1.

Maximum depth stripped is 75 ft. at another property using 3½- and 4½-cu.yd. draglines. Normally, however, cover seldom runs more than 35 ft. and the average is 24.

Mines using larger equipment include one that has supplemented an 8-cu.yd. steamer with a 3-cu.yd. diesel dragline, plus a 2¼-cu.yd. diesel dragline and a 2¼-cu.yd. diesel shovel operated by a contractor. Auxiliary equipment includes three diesel tractors with bulldozers. The steamer is used to remove overburden up to 60 ft. The limit for the dragline is around 45 ft.

Installations of larger dippers on stripping shovels at "Coal-for-Victory" strip mines included replacement of a 10-cu.yd. unit with a 12¼-cu.yd. high-strength light-alloy one several years ago. Now, a new dipper with a capacity of 14 cu.yd. is being engineered for this machine. These and other improvements have increased overburden output 20 percent in some ten years. An 11-cu.yd. dipper with the same weight replaced a 10-cu.yd. unit on the shovel at another property, increasing hourly output 60 to 70 cu.yd.

Installation of a new 35-cu.yd. elec-

Operating Reports Promote Efficiency

SHOVEL REPORT

.....Shift Mine No.....

CREW	NAME	HRS.
Engineer		
Oiler		
Pitmen		
Watchman		

Excavation
Advance .....Feet
Width .....Feet
Depth .....Feet
Estimated Yardage .....
Tons .....

Remarks: .....

Supplies Needed and Supplies Wanted: ..

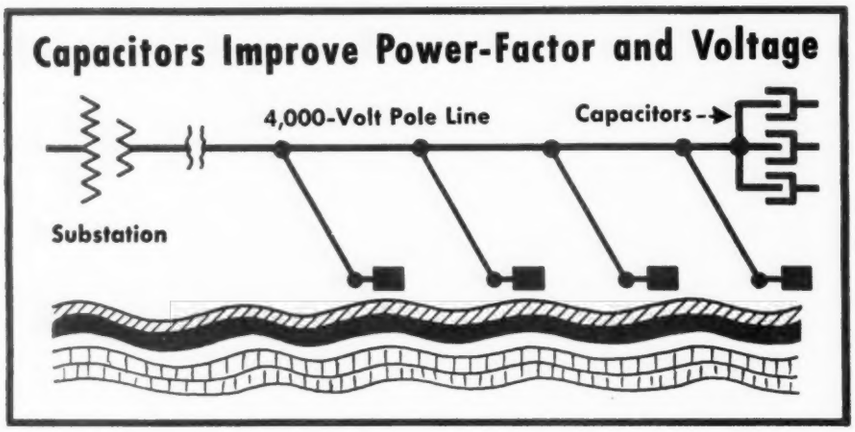
Repairs Made: .....

Date..... 194....

Check time you commence digging and when you stop. Give cause of delay in space opposite.

15
30
45
15
30
45
15
30
45
15
30
45

Shovel-Engineer



tric shovel at one property stripping an average of 50 ft. of overburden and a maximum of 64 replaced a tandem stripping unit consisting of 15-cu.yd. shovel and a 14-cu.yd. dragline. The property also is served by another 30-cu.yd. electric shovel. The new unit was responsible for increasing overburden handled from 1,200,000 to 1,400,000 cu.yd. per month and raising coal tonnage from 125,000 to 140,000 per month.

A number of "Coal-for-Victory" strip mines use a combination of equipment for flexibility and increased production in stripping. At one, a 10-cu.yd. dragline works ahead of the 33-cu.yd. shovel and removes about one-third of the overburden, averaging 37 ft. in thickness. Average output of the shovel is 1,300 cu.yd. per hour and of the dragline, 500. At another property, a 12½-cu.yd. shovel and a 10-cu.yd. dragline are employed. Ratio of feet of overburden to tons of coal at this property dropped from 6.71 in 1943 to 5.05 in 1945. Average coal thickness is 8½ ft.

Additions to equipment to increase production and handle thicker overburden at one property included a stacker. Up to 1943, stripping equipment at this property comprised an 8- and a 17-cu.yd. shovel. Since then, in addition to the stacker and 5-cu.yd. shovel to go with it, installations have included a 35-cu.yd. electric shovel with redesigned bucket for greater yardage, a 12-cu.yd. walking dragline to permit working in cover up to 80 ft. (actually 87 ft. at times) and 5- and 4-cu.yd. units primarily for recovering an upper seam. A dragline front also is available for converting one 5-cu.yd. machine when desired. At present, however, this machine feeds the stacker—used primarily on the outcrop. It consists of a car pulled out to the end of an inclined track by a hoist. Capacity of the car is 5 cu.yd. and it makes two trips per minute.

Utility equipment employed at "Coal-for-Victory" strip mines includes the bulldozer (given credit at many properties for increasing yardage by helping in clean-up work), shovels and draglines up to 3 cu.yd. in capacity and scrapers up to 12 cu.yd. Principal uses are in ditch and road building as well as miscellaneous earth-moving work. Tractor-powered brooms for cleaning the coal are used at at least one plant.

Where coal must be broken prior to loading, auger drills are the rule. Several properties with thinner coals use pinning machines and in one instance, where the coal is hard, pinning is done every 2 ft.

Loading shovels run up to 7½ cu.yd., with one operation using underground-type loading machines. Horizontal-thrust loaders also are employed. A foot brake was substituted for power lowering at one mine to speed up the loading operation.

POWER FOR STRIPPING

Good voltage and good power-factor improve pit operations, cut power cost and reduce maintenance.

Shovels as small as 4 cu.yd. are served electrically at "Coal-for-Victory" strip mines. Practices at this plant, incidentally, exemplify many of those now characterizing efficient power service. Ground protection, for example, limits both voltage and current for protection in case of a short. Capacitors have been installed at the substation feeding the shovel (through a trailing cable) to improve power-factor (from 68 to 100 percent) and raise voltage (3,900 to 4,150). Cost of power was reduced about 20 percent through decreased current consumption, reduced demand and operation on standard voltage. A loop-type cable puller saves time and labor in moving the cable.

Other "Coal-for-Victory" strip mines use both pole lines and field cables to supply pit equipment, with one reporting a gradual change from the former to the latter. Another puts cables in the pit where possible to get them off the bank, which frequently is muddy and impassible. Some lines are paralleled for the necessary capacity. One mine operates with a spare trailing cable (1,000-ft. on a spool) to speed changing from one station to another. For changing cables, four-wheel-drive military trucks have been purchased. They are equipped with a winch and cable pullers on the backs on which cables are looped as the trucks drive along. The winch is used where trucks cannot go. For use in pulling cable up the high wall and the like, a single-loop cable carrier also has been built. Capacitors were installed out at the end of the line at this property to raise power-factor to approximately unity and increase voltage from 3,900 to not less than 4,100 for better operation of pit equipment.

Power-Factor Raised

Capacitors were being installed on the stripping and loading shovels at another property. At still another, capacitors were installed for the operation by the power company. Length of pit lines is kept under three miles at this mine. When that distance is exceeded, the main substation is moved by the power company. A special cable-reel unit consisting of three sheaves through which the cable is supported and wound on and off the reel is employed. Capacitors totalling 225 kva. were put in for power-factor control and voltage improvement at the main transformer station at another operation.

Where good facilities were not already in service, several strip mines have installed improved lightning arresters. In at least two instances, station-type arresters with capacitors have been put on shovels. New-type insulators are used at another property.

Switch-house, junction-box and substation improvements have been made at several properties and include making a number of transformers portable. New three-phase transformers are employed at this property and increased use of cable connectors has added to efficiency. Switch houses have been made larger with the door in the side instead of the end and power connections have been arranged for maximum convenience. Instead of outdoor disconnects at the last junction box, one mine has gone to 400-amp. knife blades in the circuit feeding the pit in which a 33-cu.yd. shovel operates.

For ground protection, 4,000-volt cables generally include ground wires and in several cases shielding for each phase wire is supplemented by three ground wires. Safety ground-relay systems are included in protective facilities at all mines surveyed. Changes from cur-

rent to potential tripping were reported along with installation of new and more sensitive systems. One mine also went to longer ground rods of a special copper alloy. Vulcanizers are used in cable maintenance at some properties. At one, a high-voltage cable usually is worked over after four to five splices have been made and in any event when the number reaches ten to twelve.

High-Capacity Haulage

Big equipment, low-cost fuels and good roads raise haulage capacity and reduce maintenance.

Automotive haulage is the rule at all but a few "Coal-for-Victory" strip mines. The exceptions include a few using combination truck and rail equipment. Straight trucks are practically standard at properties using small stripping equipment, although at least one uses some tractor-trailer equipment and plans more. Capacity of the majority of the trucks is 2 to 7 tons, with the usual as 4 to 5 tons. One property loads directly into 4¾-ton drop-bottom mine cars handled by a 6-ton gathering locomotive and a 10-ton haulage unit.

A combination of truck and mine-car haulage at one property using large equipment is supplemented by a field transfer station. In addition to contract trucks, the mine operates two tractors with 18-ton end-dump semi-trailers. All equipment dumps into a 70-ton hopper with gate loading to mine cars operating in an old cut. Maximum truck haul is six miles; minimum, two miles. Mine-car capacity is 2½ tons and 40-car trips are handled by 10-ton trolley locomotives.

Fifteen-ton end-dump trucks serve another operation. Number in service totals 25 and mine output is 7,285 tons. With that exception, "Coal-for-Victory" strippers using large equipment employ tractor-semi-trailer units ranging in capacity from 15 up to 40 tons. Equipment and production at several properties is as follows: (1) five 35-ton and 14 28-ton (to be replaced by 35-tonners), 7,000 tons in eight hours, four- to five-mile round trip; (2) three 25- and one 30-ton, 1,800 tons; (3) four 40-ton, 2,250 tons; (4) eleven 20-ton, 1,850 tons, 12 miles round trip, requiring 30 minutes, including loading; (5) one 15-ton, six 20-ton, four 25-ton and seven 30-ton, 3,900 tons, nine-mile round trip.

Two properties that changed to automotive pit haulage in 1944 now use a common rail system for the final two-mile haul to the preparation plant. The standard-gage rail cars have a capacity of 50 tons. In addition to a 35-ton gas emergency unit, locomotive equipment consists of a 125-ton switcher and a 75-ton yard unit. Pits are served by 35-ton tractor-semi-trailer equipment hauling about ¾ mile. Five units at one property handle 1,800 tons and four at the other the same.

The trend toward diesel and butane power is still further evidenced by reports from "Coal-for-Victory" strip mines, although gasoline still is the leading fuel for small dump units. Of 92 large truck and tractor-semi-trailer units at nine mines, 31 were powered by butane and 48 by diesel fuel. Some additional butane and gas units were to be changed to diesel also. On test at one property, haulage units required 48 gal. of gasoline per shift at 15 to 16c. per gal. or 22 gal. of diesel fuel at about 7½c. per gal. More powerful engines also was a noticeable trend, with one company using 150- and 200-hp. diesel units on 35-ton units, for example, and planning to standardize on the 200-hp. equipment. Haulage units here make 30 m.p.h. loaded and 40 empty.

Tires a Problem

Experience with synthetic tires at "Coal-for-Victory" strip mines has varied from bad to good, with the consensus being that loads and speeds must both be kept down to get service. One operator using 2- to 5-ton equipment cuts the loads in the summer and average 12,000 miles with synthetics. Another now completely on synthetics with 15-ton trucks reported that improving roads raised tire mileage from around 10,000 to 14,000 to 16,000 miles. Tire quality and tread design are improving, however, in the opinion of a number of operators.

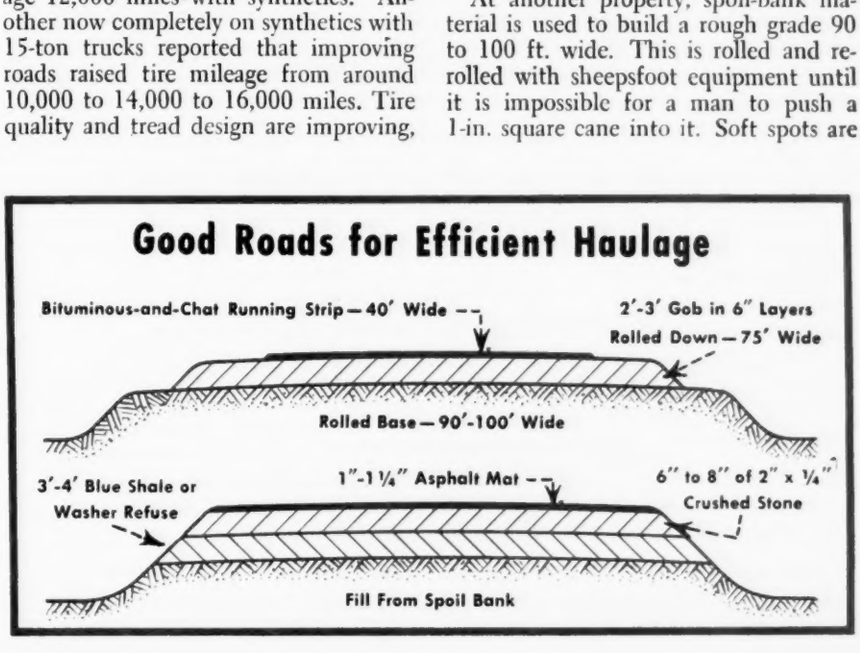
Grade reduction, better construction and improved maintenance characterized road work at "Coal-for-Victory" strip mines. Distance reduction was a factor at some, and one moved the preparation plant to a new location to cut the haul an average of five miles from pit to dump.

With small units, grades up to 10 percent or more are tolerated. Where large equipment is employed, however, the tendency is toward holding grades on main roads to less than 2 percent. Some put this limit on pit entrances but usually grades up to 7 percent or so are accepted for short distances. Shovels, draglines and large wheeled scrapers are used for excavating and filling in road construction.

Much heavier construction is the rule for roads, along with oiling or application of bituminous material for sealing the running surface. One mine went from red dog to slag to make roads stand up and will change once more, when crushing equipment is available, to limestone. Crushing of limestone on the job already is the practice at another property. Roads are built of coal with 6 in. of 2½-in. crusher-run limestone on the top on feeders and 12 in. on main lines. In wet weather, it is reported, the fine particles of coal work up through the stone and form an effective sealing coat.

Some operators make a practice of going down to hard rock in road building. Others depend on a deep, well-compacted base. One makes the fill from spoil material and then tops it with 3 to 4 ft. of blue shale or refuse from the washer. The running strip is 6 to 8 in. of 2x¼-in. crushed stone topped by a 1- to ¼-in. asphalt mat.

At another property, spoil-bank material is used to build a rough grade 90 to 100 ft. wide. This is rolled and rerolled with sheepsfoot equipment until it is impossible for a man to push a 1-in. square cane into it. Soft spots are


Good Roads for Efficient Haulage
Bituminous-and-Chat Running Strip — 40' Wide
2'-3' Gob in 6" Layers
Rolled Down — 75' Wide
Rolled Base — 90'-100' Wide
3'-4' Blue Shale or
Washer Refuse
1"-1¼" Asphalt Mat
6" to 8" of 2" x ¼"
Crushed Stone
Fill From Spoil Bank

dug out and refilled. Then, 2 to 3 ft. of gob is put down in 6-in. layers 75 ft. wide. Each layer is rolled down with a 9-ton smooth-faced roller and sprinkled. Then, two coats of bituminous material is used to seal 40 ft. of the center of the road. Each coat consists of 0.3 gal. per square yard supplemented by 15 lb. of ⅜-in. chat. It is brushed in with brushes behind trucks and is rolled with the smooth-faced roller. Good drainage is provided and no water is permitted to stand in ditches. Tractors with lugs are kept off the oiled strip. Roads are built over and along the edges of spoil banks and pit approaches are kept under 1.7 percent.

Providing for haulage at one property included a tunnel under a main highway. It was driven in rock and lined with 3 in. of sand-cement coating. Tunnels are preferred for crossings at this property because they eliminate operating over highways, make approach ramps unnecessary and eliminate the necessity for watchmen as well as delays that otherwise are encountered.

Maintenance of strip roads usually involves application of oil or bituminous coating once a year, as well as sprinkling, repairing and maintaining on a regular schedule. Special powered maintainers and patrols are employed by the majority of the operators and are supplemented by sheepsfoot and smooth-faced rollers, broom drags, rock spreaders, oil distributors, tank carts and bulldozers.

MAINTENANCE AND SUPPLIES

Regular inspection and overhauling plus supplies when and where needed raise shovel operating time and cut maintenance cost.

New and enlarged shop facilities for better maintenance have characterized operations at a number of "Coal-for Victory" strip mines in the past few years. Greater stress is being laid on records of delays and their causes, on records of repairs and service and on inspection to prevent breakdowns. One property, for example, keeps individual records on both repairs and lubricants for automotive equipment. At another, inspection of all types of equipment has been tightened. Tractors and trailers are gone over by the automotive mechanics, shovels by the master mechanic and shovel operators and other pit equipment by the master mechanic and foreman. Weekly inspection and keeping of accurate records has increased working time 20 percent at another pit, which also has increased rope life 10 percent by dressing it with a better lubricant.

New and larger shop facilities include the following: (1) new garage for trucks, including pressure water system and steam cleaning unit; (2) new 100x36-ft. concrete-block garage with concrete roof topped off by asphalt and gravel, and stalls for trucks floored with 6 in. of concrete reinforced by steel matting; new 66x110-ft. concrete-block machine and welding shop—steel frame and galvanized roof; new 50x136-ft. warehouse and welding shop providing additional floor space for heavy equipment; (3) new combined shop and garage—fireproof and warm; (4) additional general repair and maintenance shops and warehouses in addition to central shop serving this and other properties and able to handle any type of repair; enlarged fireproof oil house, etc.

Portable welders and repair trucks are widely used for field repairs. Where welders are not mounted on trucks, they usually are equipped with wheels and hitches for towing to the job. The repair truck employed by one company consists of 300-amp. electric welder with 150 ft. of cable and drills and grinder mounted on a 1½-ton chassis. Another on a 1½-ton chassis includes gas welding equipment as well as electric. Still another property has a variety of repair, supply and fueling units. One is a mechanic's garage-service truck for small repairs, including changing tires. A mobile crane for field repairs and handling heavy materials is being purchased. It will handle around 20 tons with a 40-ft. boom and 8 tons with an 80-ft. boom, or enough to permit taking any unit off the biggest of shovels (35-cu.yd.). A small field shop for running repairs to trucks, bulldozers and similar equipment has been installed at the farthest pit, along with a two-truck garage.

Dipper teeth generally are built up with a tough rod and then hard-surfaced. Five teeth have been found better than six or seven on the 35-cu.yd. dipper used at one property. Bases on a new dipper (40 cu.yd.) are to be made 2 in. longer for better entrance into the bank. To swing the new dipper, the swivel in the knee-action handle will be transferred to the knuckle and the dipper itself will be made of high-tensile steel with a high-tensile bail to get 40 cu.yd. with a decrease in bail pull. Separate 75-hp. motors on each crowd rack rather than a single 150-hp. unit and gear train have been found to result in much less trouble with handle and "wishbone" cracking.

In addition to high-tensile dippers, several operators have made substantial use of light-weight high-strength alloys for booms, dipper handles, trailer bodies and similar applications. Improved electrical insulation, including glass and asbestos, has been found helpful at several properties in preventing failures. To keep track of condition, one company maintains a card file for every motor.

Improving roads has been the major line of attack on the problem of tire maintenance, in addition to spot vulcanizing and patching, constant checking of air pressure, correct matching on wheels and daily washing. Road condition and air pressure are, in fact, the big factors in life in the opinion of the majority of operators. To facilitate changing tires, a larger compressor and air wrench were installed at one property.

Lubrication Improved

Developments in lubrication include installation of new equipmnt for servicing trucks, and at one property includes a barrel line and metered filling. A lubricating truck taking drums has been constructed at another operation. It includes a gas-powered air compressor and five outlets for various lubricants, each with a hose on a reel. It services tractors, maintainers, sweepers and the like primarily. By using another hose, a tractor operator, for example, can work with the oiler and thus speed up the job. The lubricating truck also services trucks when they are worked more than one shift and, in conjunction with a fuel truck, permits making them ready to go again in seven minutes, compared to one hour and 15 minutes to come to the shop service station. Service in the pit also includes air for tires. This mine also has installed a central greasing system in the revolving deck of the 35-cu.yd. shovel. Below the deck, hand greasing still is the rule but the groundman is provided with a high-pressure gun.

Small parts supplies are kept at field stations or in cabinets on shovels at several strip mines. In addition to main warehouses with the bulk of the parts and materials, a few operations participate in supply pools with other mines, borrowing back and forth to make it unnecessary for all to keep certain common items. Special equipment for handling parts and materials include the mobile crane previously noted. Several operators maintain one or two winch trucks. Where there are two, one normally is a light unit and the other a heavy one. Low-wheeled trucks or trailers for moving cats, tractors, shovel buckets, sticks and the like also are employed by some operators to facilitate maintenance and improve pit operations.

Special truck equipment at one operation, in addition to greasing and other units, includes a heavy supplies truck, fuel truck and cable-repair unit. The supplies truck is a heavy all-wheel-drive army unit, tandems in the rear, for taking items up to 12 tons to any equipment in the field needing repairs. The fuel truck services pumps, trucks and

RAISING STRIPPING EFFICIENCY

1. Ditching and dams on the bank to keep water out of pits.
2. Gravity drainage from pits through pipes through the spoil banks or otherwise.
3. Better pumps with better weather protection.
4. Acid- and abrasion-resisting pumps and pipe where necessary.
5. Higher-capacity drilling equipment for making larger holes faster; development of special drills for special overburden conditions.
6. Power feeds on overburden drills.
7. Improved bits for faster drilling and better results.
8. "Decking" or splitting of charges and use of high-level holes for breaking hard material up in the bank.
9. Larger holes for concentration of charges where needed.
10. Better sizing up of bank conditions for better drilling and shooting.
11. Proper choice of explosive or breaking medium.
12. Larger and more efficient stripping equipment.
13. Larger, lighter-weight, high-strength, better-designed dippers to increase strip-shovel capacity.
14. Tandem operation in high banks.
15. Draglines for deeper overburden.
16. Proper use of auxiliary equipment, such as the bulldozer, utility shovels, draglines and scrapers to relieve the stripping units of cleaning up and miscellaneous work.
17. Better coal-drilling equipment.
18. Larger coal-loading shovels with better-designed dippers or use of special loading equipment better suited to seam conditions.
19. Capacitors or other corrective equipment for better power-factor and voltage.
20. Better lightning protection.
21. Better cable-handling facilities.
22. Movement of substations to reduce transmission distance.
23. Better switch houses and junction boxes.
24. Ground-relay protection.
25. Larger trucks and trailers.
26. Diesel or butane power and higher-horsepower engines.
27. Better roads—reduced grades, better construction, good drainage, weatherproof surfaces, better maintenance and reduced hauling distance.
28. Bigger and better shops and shop facilities.
29. Regular inspection and good records of equipment condition, repairs and delays and their causes.
30. Mobile field-repair units.
31. New metals and insulating materials for reduced weight, longer life and reduction of failures.
32. Good lubricants and lubricating methods.
33. Good tire service and maintenance.
34. Ample supplies, good warehousing and parts as necessary in the field and on shovels.
35. Special winches, winch trucks, stationary and mobile cranes and trucks for handling heavy parts and material and facilitating field repairs.
36. Fuel and service trucks.
37. Organization, training and joint management-employee cooperation for greater safety.
38. Stimulation of safe operation through educational measures, meetings, first aid, etc.
39. Inspection, guarding and other electrical and physical safeguards, including fire-fighting equipment and improved explosives-handling facilities.
40. Protective clothing.

all other field equipment. It also is a tandem-rear unit with all-wheel drive so it can go anywhere to dispense gasoline and fuel oil. It is equipped to meter. The cable-repair truck includes two cartridge-powered splicers.

SAFETY IN STRIPPING

Safe equipment and safe methods eliminate injuries and increase efficiency.

Natural conditions make strip mines safer places to work but operators of "Coal-for-Victory" strip mines also use organization, training and elimination of hazards to reduce injuries even more. Full-time safety directors are employed at a number of properties and at others responsibility is vested in the operating head. Joint safety committees and employees safety organizations are attaining effective results at several properties, and the flow of suggestions resulting from cooperative action is given credit for substantial improvements in injury reduction. Meetings and continuous educational campaigns by word of mouth and material for the eye are general. Several operations have 100-percent first aid training and others are working in that direction.

Independent inspections by state and federal authorities, insurance-company representatives and, even, local fire-department chiefs supplement company investigation of hazards. New and additional fire-fighting equipment has been installed on equipment units and explosives-handling facilities have been fireproofed and otherwise rendered safer.

Electrical safety has been promoted by widespread use of ground-relay equipment, improved connectors, safer switch houses and junction boxes, fencing of electrical installations and so on. Special ventilating equipment has been installed in some shops. Safety clothing at a number of properties includes shoes, hats, rubber gloves, goggles and slicker suits for maintenance men when working in wet places.

PREPARATION For Consumer Satisfaction

LOW IMPURITY CONTENT, uniformity in quality and correct size for the job are the major characteristics of a well-prepared coal. Additional desirable characteristics are freedom from excess surface moisture, dust and tramp iron. A high degree of conformity with these standards marks operations at "Coal-for-Victory" mines, which also have as their goals minimum outlays for equipment, power and labor in addition to recovery of the maximum tonnage of salable coal.

Cleaning With Efficiency

Better cleaning reduces impurity content and increases uniformity. Recovery of all salable material that is economically possible increases realization. Modern laboratory and control facilities result in a better product with fewer losses.

While some coals need little or no preparation beyond sizing, "Coal-for-Victory" mines are large users of mechanical equipment and operate some of the largest and most modern preparation plants in the United States. Other such plants are planned along with refinements in existing facilities and in testing and control equipment. Several laboratories, for example, are equipped not only for size checking and proximate analysis but also for ultimate analysis, washability studies and research. For better results, some operators are moving control laboratories into the plant or from locations within the plant to others closer to the cleaning operations. At one property, where the laboratory was moved into the plant, construction included glass brick—soundproof and less interference with the passage of light in addition to being easier to clean. Additional testing facilities and laboratories installed or planned range from float-and-sink units up to full-scale central projects serving several mines.

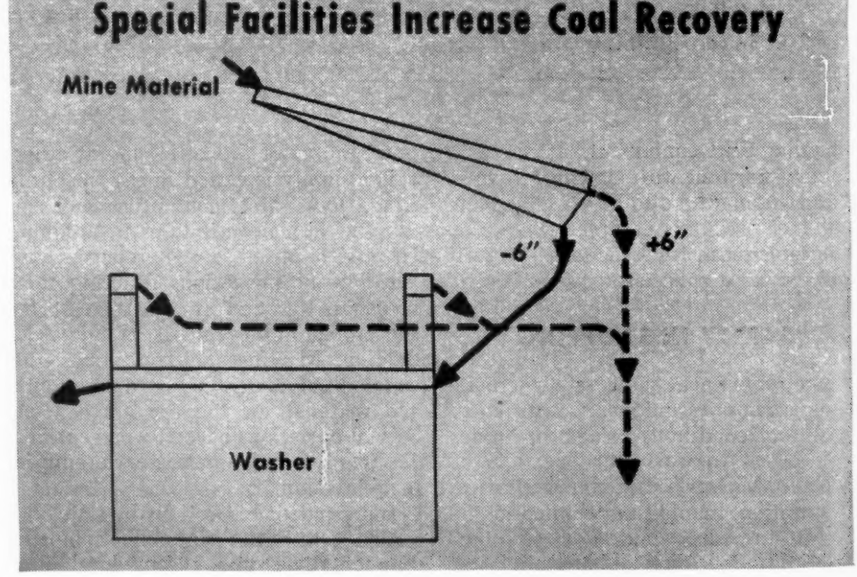
Reconstruction or additions to tipples to improve efficiency and conserve manpower include such things as the planned installation of a picking belt to improve preparation of 3x1¼-in. coal. At another mine, picking on a chain-type boom, a change was made to a shaking unit for better coal distribution and improved results. A third—one of several—installed better lights to secure a substantial increase in performance.

New tipples included one replacing a worn-out installation and provided with 20-ton bins for three sizes as well as exhaust fans for removing the dust. By eliminating pushing of cars, the working force is reduced one man. Better facilities result in better picking and the new installation includes equipment for dustproofing.

A new tipple at another property is operated with eight motors compared to 26 at the old. This results from extensive use of gravity chutes. The man who operates the controls also picks, and picking is done in a separate room with steam heat, improved tables and special lighting. Picking is now accomplished with four less men per shift. Flop gates facilitate changing cars.

For higher efficiency in the removal of impurities, greater uniformity of product, cleaning of sizes difficult or impossible to clean by hand and conservation of manpower, numerous "Coal-for-Victory" mines added to mechanical-cleaning facilities. Aside from new plants, installations for individual sizes in plants previously without mechanical cleaners were frequent, along with revisions or additions in plants already mechanically preparing coal.

One central wet-and-dry plant increased the size range washed from 5x¼ to 6x⅛ and raised capacity of reject facilities from 7 to 23 percent to handle more rock from the mine by speeding up elevators, conveyors and washer-reject discharges. Another plant added a dry cleaner for ¼x0, using a wet unit



for coal over that size, and increased recovery. A washer at a third property raised the capacity of the installation by taking over some sizes from the original plant. Air equipment for minus ⅜, leaving the larger coal to the original wet unit, was added at a fourth property. Several changes at a fifth culminated in air equipment for ¾x¼ and a wet washer for the remainder. Air for minus ¼ and wet for plus is the rule at a sixth.

A washer for 7x4 is being installed at a seventh plant. At an eighth, recently relocated and redesigned, a washer was added to the previous wet-cleaning equipment. Now, instead of five to seven pickers, only two are employed to remove rock from the coal. At a ninth plant, a washer and two dewatering screens were added to improve preparation.

Modern Plants Installed

Full-scale new plants went in at a number of operations in the past two or three years. One, as an example, included a washer, storage bins, crusher, magnet, vibrating screens, centrifugal dryer and dustproofing facilities. All coal will be washed down to ½ in. In addition to several centrifugal dryers, heat dryers also were installed for reducing surface moisture at washing plants.

The advantages of storage facilities ahead of preparation plants and equipment for ironing out the rate of feed, preventing interruptions and, with several bins and feeders, evening out the ash and sulphur in the feed to mechanical cleaners, resulted in a substantial increase in the number in service. Also, where bins already were on hand, they were added to in a few instances. At one plant, for example, storage capacity (originally 40 tons) is being increased to 200 by the construction of steel-bin equipment. In a few instances, bins led to a reduction in labor. One plant reduced the working force one man, as an example, by putting surge hoppers ahead of air equipment.

Use of storage and blending bins also provides an opportunity for rough picking. At one property operating a blending installation, grizzlies were added for scalping ahead of the raw-coal shakers. This permitted reducing number of pickers from four to one. Pan feeders under the blending bins were replaced by belts.

Increasing coal recovery was the subject of increased activity at "Coal-for-Victory" mines and took a variety of forms. One was closer control of mechanical-cleaning equipment to reduce loss of coal to the refuse. Another was crushing and recirculation of middlings. Another was recovery of slurry.

For returning middlings to the regular cleaning equipment, one mine plans the installation of a crusher, screen and recirculating facilities, which will recover 40 to 60 tons a day on a 4,200-ton basis of operation. Another crushes middlings and sends them to a separate jig plant for retreatment. Another recovers about 100 tons of ⅛-in.x1-mm. slurry a day through the use of centrifugal drying equipment. Another has gone down to $\frac{3}{16}$ in. in dewatering to reduce fines going into the wash-water system.

Plants in service to recover coal from mine material include one reclaiming 200 tons daily from 650 to 700 tons of road cleanings, roof-fall material and the like. The material is first passed over a 6-in. scalping screen. The minus 6-in. is then crushed to 2 in. and treated in a jig.

Steam coal is recovered from a mixture of mine refuse and jig middlings at another property that has gone to full-seam mining. The material is first reduced to 4 in. by crushing with quarry-type equipment. It then goes into a jig with a rated capacity of 125 tons per hour. The plant was set up on the basis of recovering 75 percent of 300 tons of middlings and 30 percent of 700 tons of mine rock per day as steam coal.

FOR BETTER PREPARATION

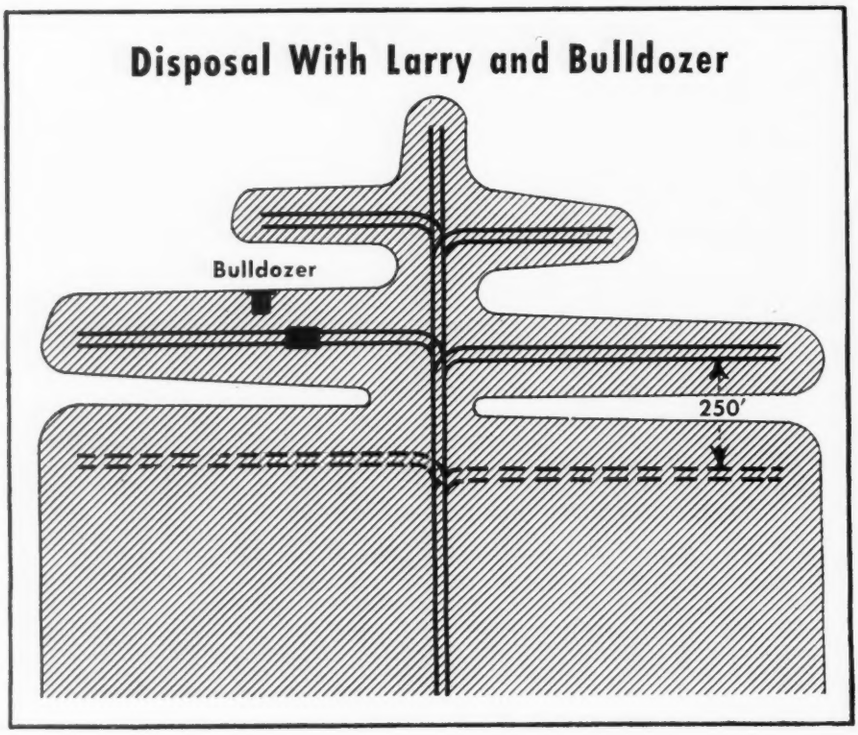
1. Good laboratories and testing facilities.
2. Better picking facilities.
3. Better picking lights.
4. Installation of mechanical-cleaning equipment.
5. Raw-coal storage and blending facilities.
6. Increased recovery through better control of mechanical cleaners, crushing and retreatment of middlings and pickings, slurry-recovery facilities and equipment for salvaging coal from mine material.
7. Good screening equipment for accurate sizing.
8. Good mixing and blending equipment.
9. Crushing for greater flexibility and higher yield of coarse sizes.
10. Dustproofing.
11. Dewatering, drying and freezeproofing.
12. Tramp-iron removal.
13. Corrosion- and abrasion-resisting materials for screens, screen cloth, conveyors, elevators, chutes, flumes, tanks and other preparation equipment.

BETTER SIZING AND TREATING

Accurate sizing increases realization. With good mixing and blending, dustproofing, freezeproofing and tramp-iron removal, it increases consumer satisfaction.

Getting size and physical characteristics that increase the realization to the producer and promote satisfaction in use has involved, in addition to crushing, screening and mixing, a wider use of magnetic pulleys and chute magnets, dustproofing with chemicals, chemical compounds and oil, and freezeproofing with chemicals at "Coal-for-Victory" mines. There has been a sizeable increase in use of magnetic pulleys on mine-run belts and of pulley and chute-type magnets for other sizes—particularly railroad fuel and stoker. "Coal-for-Victory" producers also expect an increase in demand for dustproofed and freezeproofed coal and are proceeding accordingly.

Crushers alone or in combination with rescreening equipment, bins and mixing equipment have been added to facilities at a number of properties. One objective at several has been increased flexibility in meeting market demands and consequently an increase in running



time. Another is a better yield of coarse sizes in crushing and breaking, also reflected in installations of pick-type breakers. Another objective in the use of crushers for coal for certain purposes is to get a better mixture and avoid unevenness in impurity percentages.

Standard mixing conveyors have been supplemented by bin-and-feeder equipment for making finer grades to order or with more even proportions of the various fractions. Storage facilities for larger sizes have been accompanied by special lowering equipment to reduce breakage, while equipment for removing degradation is almost universal.

Improvements in screening equipment have included wider employment of vibrating units for small sizes as well as large. The area of shaking and vibrating screens has been increased at some mines for better results. In one case, this was achieved by lengthening screening units, this and other improvements making it possible to produce over 11,000 tons monthly with 16 men compared to 5,000 tons with 17 men in 1942. Another operation reported that a special design of shaker permitted a substantial increase in capacity with no increase in size.

Several changes in screen plate and screen cloth were made for better performance. One mine increased plate thickness $\frac{1}{8}$ in. Another changed cloth on dewatering units and vibrators and gets twice the life in chutes and flumes. Another screening minus $\frac{9}{16}$ out of 6x0 went from a fine-wire cloth to a coarse. Results were better screening and four times the life.

Stainless-steel screens and screen cloth marked up substantial gains at "Coal-for-Victory" mines because of resistance to enlargement, reduced weight and longer life. This and other high-strength corrosion- and abrasion-resisting steels were widely applied to flumes and chutes, along with hard-metal liners, wearing strips, etc., in conveyors. One property, in addition, plans to replace metallic conveyors with belts to reduce maintenance. Several see labor savings of one man or more per shift, in addition to better lubrication, by the installation of central automatic or one-shot greasing systems. Manganese chains for wash boxes was another maintenance reducer reported, along with tipping of crusher teeth and hammers with hard metals and the use of lime in wash water to reduce corrosion.

Plastering of settling tanks, chutes, flumes and cones with a sand-cement mixture on a base of woven wire tack welded in place has been found to materially extend life and reduce replacements. One sump tank so treated—in this case the coating was blown on—has lasted four years and still is good.

EFFICIENT REFUSE DISPOSAL

Proper equipment and methods materially reduce cost of disposing of preparation refuse and mine rock.

New equipment, larger units and changes in types have all been resorted to to increase efficiency in refuse disposal at "Coal-for-Victory" mines. Changes to full-seam mining also were factors at some properties. With better timbering to hold the top and better supervision of disposal itself, full-seam mining at one operation permitted reducing men engaged in disposal from 14 to three. Another property installed a crusher to permit handling picking-table refuse on a small belt and plans extension of the belt system closer to the dump and the use of a bulldozer for levelling to reduce the number of men required from eight to one.

Changes in methods included such ones as the following: installation of a chute to a 5-ton truck instead of throwing pickings on the floor, with the truck driver picking when not driving; installation of a hoist to eliminate pushing cars off the tipple and construction of a rotary slate dump to replace end-dumping equipment with a labor saving of 30 percent; installation of bins and conveyors to hoist-operated refuse cars, saving one man per shift, getting the dump away from the tipple and town and releasing mine cars more quickly; augmenting tramway with additional dumping equipment to increase mine-car turnover; dumping refuse with a 28-ton side-dump trailer for road building in good weather; putting refuse down in 2- to 3-ft. layers and rolling it over a 40-acre field to a depth of 15 ft. in places, no fires in a year.

Changes in types of equipment included replacement of an aerial tram with a 50-ton bin and truck haulage; replacement of truck haulage on contract with a 4,000-ft. single-bucket tramway, increasing mine-car availability among other things; installation of an aerial tram to eliminate truck haulage, reducing number of men from six to one; installation of a tractor wagon to replace two larries, saving four men a day in tracklaying and other work; changing from larry disposal of mine rock to truck and bulldozer, requiring one man part time compared to a larry operator and tracklayer previously; use of a 20- or 25-ton larry with trailer in place of an aerial tram; augmenting trams with trucks; and replacement of three 1½-ton trucks with one 5-tonner.

One property with a 38-percent reject solved its disposal problem by the installation of two 25-ton larries (one a spare at present) and a tractor with bulldozer. The track, on an 8-percent grade, is built on 18 in. of broken stone. Laterals 250 ft. apart are made as shown in the accompanying diagrammatic illustration. From these, the bulldozer pushes the material 125 ft. each way. Cost of disposing of 60,000 tons monthly, including labor and power, is $1,000.

EXIDE SALUTES

SHERIDAN-WYOMING COAL COMPANY WINNER OF A "*COAL FOR VICTORY*" AWARD . . . . .

One of the fleet of 8 Exide-Ironclad powered Joy shuttlecars serving the Sheridan-Wyoming Coal Company.

The 1945 record of the Sheridan-Wyoming Coal Company shows what progressive management and modern mechanized equipment can do. A large share of the credit for their increased production they give to more flexible mining operation resulting from the use of self-contained, Exide-Ironclad powered shuttlecars.

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★ **MINE OPERATORS:** If you have not read the U. S. Bureau of Mines circular I. C. 7328, be sure to get a copy from the Bureau of Mines, Washington, D. C.

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The Foremen's Forum

How Much Rock Dust Will Assure Immunity From Coal-Dust Explosions

With All Coal Dusts, Methane in the Air Spells More Danger—Volatile Water of Coals in "Explosibility Flat" Seems to Offset Their Volatile Methane, Making Them All Need Equal Immunization

Rock dust reduces the explosibility of both coal dust and methane. In an earlier article, in this department, November, 1945, p. 116, was analyzed the effect of the presence of methane on the quantity of rock dust needed to make coal dust immune to explosion. Anthracite dust, with its low percentage of volatile matter, will not explode, so it is natural to expect that coals that approach anthracite in volatile content will be found to be greatly aided in explosion by the presence in the air of methane and that coals rich in volatile content will be less affected by the content of that gas in the mine air, and this proves to be a fact.

Methane in Coal Vs. Methane in Air—In the second table of the earlier article, it is shown that, in the case of coals with 14 percent of volatile matter, (1) when there is no methane, (2) when there is 1 percent of that gas and (3) when there is 2 percent, the quantities of immunizing rock dust that must be added to the coal dust are respectively: (1) 16.28, (2) 44.93 and (3) 92.31 percent. These three figures are related to each other as are 1.00:2.76:5.67, (see Table I of this article); that is, 2.76 times as much rock dust is needed to make coal dust inexplosive when there is 1 percent of methane and 5.67 times as much when there is 2 percent of methane. On the other hand, where the coal contains 49 percent of volatile matter, the first group of figures are replaced in the tabulation to which reference has been made by (1) 222.58; (2) 300.00; (3) 426.32, and these figures are related to each other as 1:1.35:1.92 (again, see Table I of this article). Evidently the explosive effect of the methane in the air is dwarfed in the latter series of coals by the explosive quality of the high-volatile coal, mainly by the methane in the coal itself.

Must Not Overlook Air-Borne Methane—Still, the effect of the air-borne methane in the air is considerable and cannot for a moment be overlooked. Some companies strive only for a maximum of 1 percent of methane in the return and not more than 2 percent at the face. In the dusty return, therefore, there should be in the case of the coal with 49 percent of volatile matter 1.35 times as much rock dust per ton of coal dust as in fresh intake air and at the dusty face 1.92 times as much rock dust per ton of coal dust as suffices with fresh intake air. Some allowance might be made, however, if the coal is oxidized by long exposure or mixed with roof dribblings.

Methane Needs Rock Dust

Presence of Methane at Face Jeopardizes Workings—Because methane increases the danger of a coal-dust explosion, one has to be careful at the face of the workings, whether room or heading, because 2 percent of methane not infrequently is found in such places and because the rock dust is lying down, whereas the coal dust, at the face, is likely to be swirling around and so can explode before the rock dust gets into action. Some of the coal dust therefore starts, as it were, before, to use a racing term, the gun is fired, and the methane usually before either of them.

The Bureau of Mines figures are perhaps a little conservative; Greenwald hints that they may be not wholly representative. They are based on both coal dust and rock dust being all on mine objects when the explosion starts—in other words, "lying down on the job," on the floor, ribs, roof, crossbars, etc. That is not often the actual mine condition. Then again, with time, the rock dust becomes caked and slow to rise to the occasion. So a little more dust than is tabulated fits more aptly with the slogan "Better sure than sorry."

Multipliers for Volatility of Coal—Table II of this article is based on the figures in Table II of the previous article and therefore only indirectly on those in Table I of that article. It does not show percentages but multipliers or ratios. It answers such questions as: A certain quantity of coal having 14 percent of volatile matter in its coaly substance requires 16.28 percent of incombustible dust to be added to it for immunization; how many times that much will be needed to immunize a coal of 17 percent or 49 percent volatile content? The

TABLE I—HOW MUCH INCOMBUSTIBLE DUST MUST BE INCREASED WHEN PERCENTAGES OF METHANE ARE ADDED

Calculated Volatile Percentage in Coal After Figures for Moisture and Ash Have Been Deducted and Percentage Recalculated	How Many Times As Much Incombustible Dust Are Needed When Methane Percentages In Air Current Are Augmented		
	Methane in Air Current		
Percent	Methane 0 Percent	Methane 1 Percent	Methane 2 Percent
14	Base = 1	2.76	5.67
17	Base = 1	1.82	3.20
20	Base = 1	1.56	2.40
22	Base = 1	1.41	2.17
25–40	Base = 1	1.42	2.14
43	Base = 1	1.37	2.08
49	Base = 1	1.35	1.92

TABLE II—HOW RATIOS OF INCOMBUSTIBLE DUST TO COAL DUST MUST BE INCREASED WITH INCREASE OF VOLATILE CONTENT

Calculated Volatile Percentage in Coal After Figures for Moisture and Ash Have Been Deducted and Percentage Recalculated	How Many Times As Much Incombustible Dust Is Needed per Pound of Coal Dust Having the Volatile Content Specified in Col. 1 As Is Required When the Coal Dust Contains only 14 percent Volatile. Calculated for Conditions When Percentage of Methane in Air Is		
Percent	Methane 0 Percent	Methane 1 Percent	Methane 2 Percent
14	Base = 1	Base = 1	Base = 1
17	2.76	1.82	1.56
20	5.45	3.07	2.30
22	8.11	4.32	3.25
25–40	9.61	4.95	3.63
43	10.46	5.19	3.84
49	13.67	6.67	4.62

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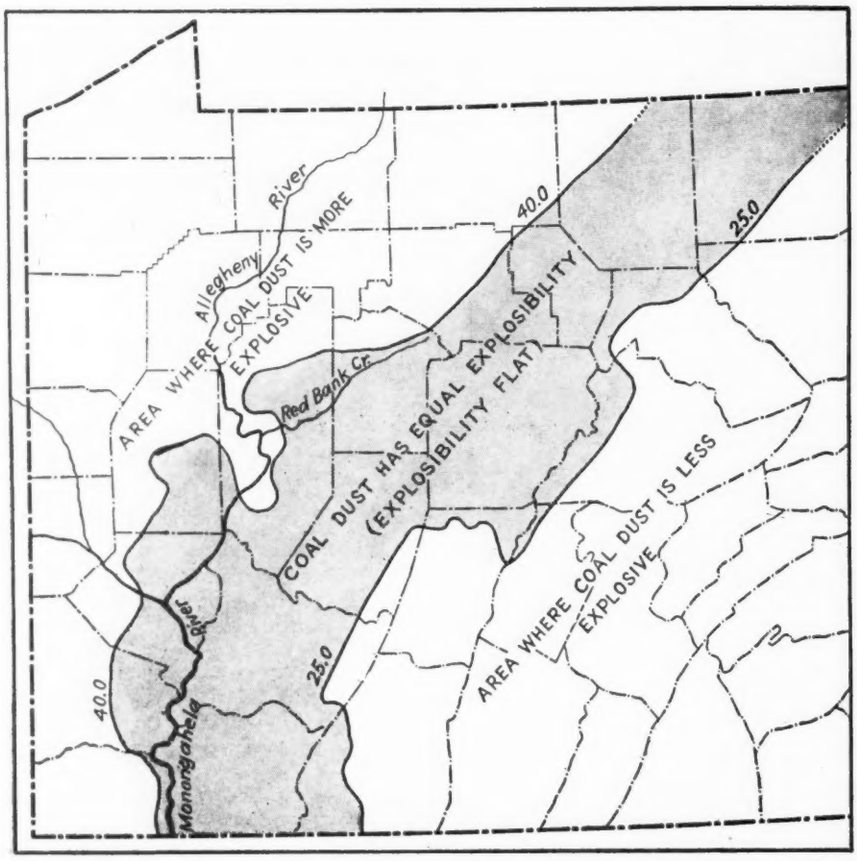


Nearly all the bituminous coal of Pennsylvania has between 25 and 40 percent of volatile matter as based on its pure-coal content. This map shows the area that would be covered by coal within this range, judging by such coal as is present. This range is dubbed the "Explosibility Flat" because the coals within this range have been found to require one and the same quantity of non-combustible dust to render them free from explosion. This map predates 1938; a map made today might locate the lines somewhat differently and probably enlarge the area of the flat somewhat.

answer taken from the table is 2.76 and 13.67 times, respectively.

This table emphasizes again the fact that the methane percentage is more important with a low-volatile coal than with a high one, as indeed might be expected, for the methane explosibility is constant for any percentage and the explosibility of coal dust increases when the percentage of volatile is increased—with the exception of the coals having 25 to 40 percent volatility.

Uniform Over Wide Area

Explosibility Flat Covers Pennsylvania Bituminous Region—In the illustration is shown the area in Pennsylvania in which the coals have volatile matter contents between 25 and 40 percent, according to an early isovol map of the Pennsylvania Topographic and Geologic Survey. The coals in this range, it was stated in the previous article, need equal quantities of incombustible dust to render them inexplosive. This was designated as the "explosibility flat" because in plotting the needed percentage of rock dust as against volatile content, a flat place in the graph appears between 25 and 40 percent of volatile content. It will be noted that this includes nearly all of the areas in Pennsylvania where bituminous coal is mined and their volatile content is available.

To Recapitulate—Below 25 percent volatile, the explosibility increases with increased volatility; above 40 percent the same is true, but in between—the Great In-Between—where most of America's coals are being mined, the volatility seems to have no effect whatsoever. All the coals are equally subject to explosion; that is, need the same quantity of immunizing dust regardless of analysis.

Why this uniformity exists in values that with this marked exception soar steadily upward is difficult to explain. It is true that anthracites and low-volatile coals when heated emit mostly highly explosive volatile matter, and medium-volatile coals emit both highly explosive volatile matter and water vapor, while high-volatile coals evolve a still larger proportion of water vapor. This in a sense explains matters, because the water vapor negatives the highly combustible contents and, so to speak, dampens the ardor of the high-volatile coals.

However, while this explains the phenomenon in a degree, it does not explain why low-volatile coals are so rich in free hydrogen (mated only to carbon) and high-volatile coals have so much captive hydrogen (bound down by combination with oxygen). If explained, this would really solve the problem. But still we do not and probably would not understand why some midwestern coals, relatively rich in water vapor, need more immunizing dust than the coals of the explosibility flat. The coals of the Far West, however, may be expected not to follow the regular pattern because they are more recent, are derived also from a more modern type of vegetation that grew in a different soil and contain, at least in some cases, more resins.

•

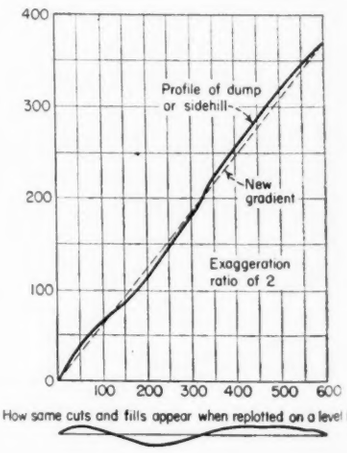
How Plane Profiles Can Be Misread

In the language of civil and mining engineers, a profile is a vertical cross-section taken along a line that may be straight or curved. It is customary to construct it with the vertical scale larger than the horizontal because such a profile would be of unwieldy length and because the vertical measurements are those principally at interest. This scale of exaggeration runs from 1 in 2 to 1 in 500, the latter a ratio often used in making profiles of continents.

Such exaggerations usually do no harm and are quite helpful, as they permit of posting more details on the drawing, but in making a profile of a steep sidehill or rockdump, which has to be graded to accommodate a gravity or other plane, it may lead to dismaying misapprehensions, for the crests that have to be cut and the hollows that have to be filled seem inconsiderable, being judged by the ordinary individual by their departure from a gradient line as measured at right angles to that line.

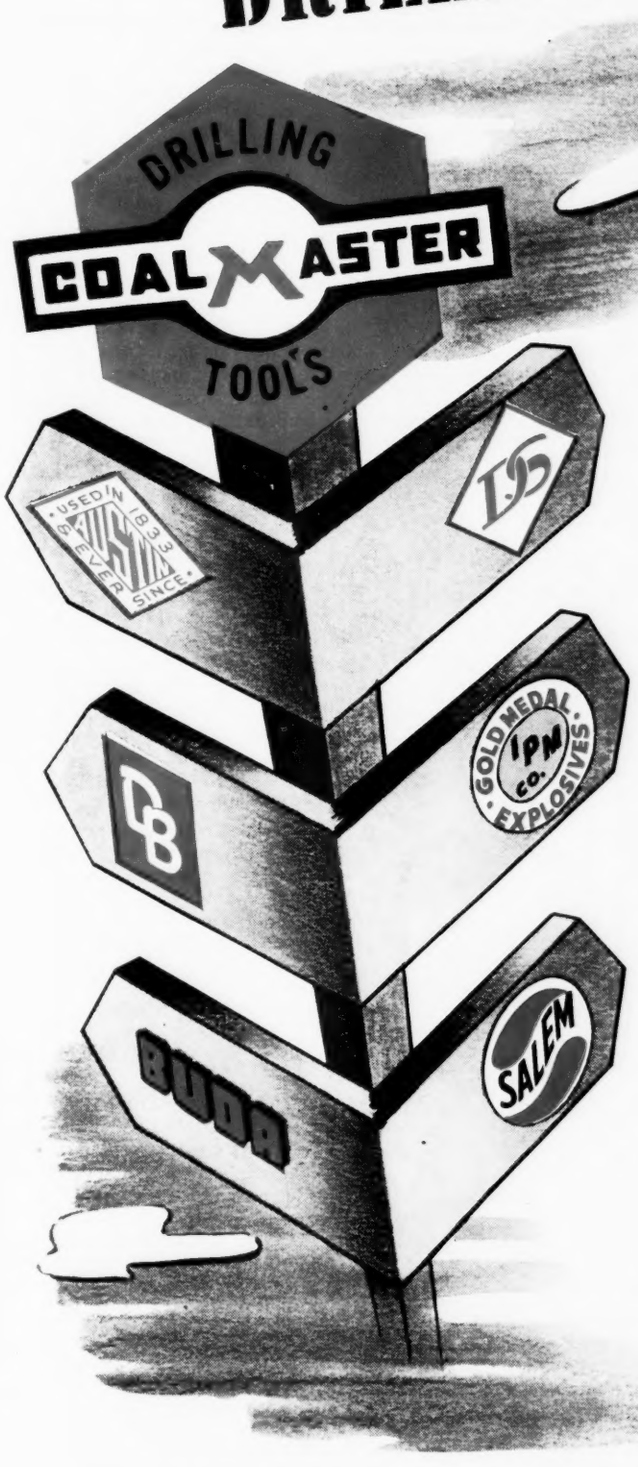
Minimizes Cuts and Fills

It would be almost impossible to train the eye to judge of cuts and fills by vertical distances between gradient and profile lines at any given point. It is well, therefore, to plot the vertical differences from a horizontal, not a pitching, line, but that requires redrawing the profile from calculations to be made after a preliminary decision has been made as to the gradient. Even without exaggeration a steep profile is misleading.



How same cuts and fills appear when replotted on a level line

7 SIGNS TO BETTER DRILLING TOOL SERVICE



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State-Board Questions

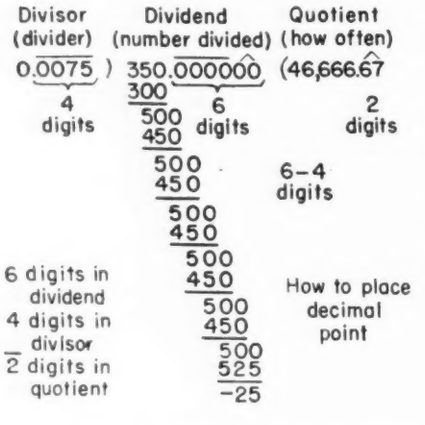
Mine Foremen, Ohio

Air to Turn Trick

Q.—If a section of a mine liberates 350 cu.ft. of methane per minute, how many cubic feet of air is required to reduce the percentage of methane in the return to 0.75 percent?

A.—As this question stands, no answer can be given. Apparently a printer's error has added the word "to" where its presence can only mislead and create confusion. It is clear that some regard would have to be paid to the quantity of methane present before the reduction of 0.75 percent, for surely the same quantity of air would not serve to reduce all percentages of methane, however large, to that relatively safe figure.

Omitting then the word "*to*" from the question, the methane is to be reduced by 0.75 percent, or 0.0075 of the volume of the mixture of gases in the return. If, then, 350 cu.ft. is divided by 0.0075, we shall obtain the number that multiplied by 0.0075 will give 350 cu.ft. Thus, we can find what number of cubic feet of air will make the desired change. Dividing 350 by 0.0075, as suggested, we have 46,666.67 cu.ft. That last figure multiplied by 0.0075 will give us 350; so 46,666.67 cu.ft. is the number of additional cubic feet that will reduce the methane percentage 0.75 from the original figure.



This figure has been carried to an absurd degree of mathematical accuracy, for reasons that may be apparent in the accompanying chart with its exemplification of this problem in division. As some have difficulty in recalling how to place their decimal points, it is well to recall that in division when the number of digits (separate figures) in the divisor that lie to the right of the decimal point are counted and deducted from the number of digits (separate figures) in the dividend that also lie to the right of its decimal point you obtain the number of digits in the quotient that lie to the right of the latter's decimal point.

Finding that number of digits in the quotient, all you have to do is to count off the ascertained number of digits beginning at the right and, having done so, to put the decimal point to the left of those digits. A system of marking up divisor, dividend and quotient by drawing brackets above the lines of figures may prove even more easy to understand and memorize.

Coal Age Quiz

Range of Explosibility

Q.—What is meant by the range of explosibility of a combustible gas?

A.—Any gas explosible in air has a definite determinable low percentage, or "lower limit," and a definite determinable high percentage, or "upper limit," at which, in the presence of flame, it will just start a self-perpetuating (that is, a self-extending) combustion in a given direction—up, down or sidewise.

A lower percentage than the definite determinable low percentage, it is true, will burn nearby combustible gas, but the flame of combustion will not be vigorous enough to extend the ignition, because the inert gases, which the combustion itself generates, will dampen the flame and because the more feeble flare of the ignited gas will not be able to do what the original more vigorous oil flame succeeded in doing.

A higher percentage of explosible gas than the definite determinable high percentage will lower, by its percentage, the percentage of oxygen, and the flame of the explosive gas accordingly will be less vigorous, for the vigor depends on the quantity of oxygen present. Methane is said to have 5 percent as its lower explosible limit (not its lower combustible limit) and 15 percent as its higher explosible limit (not its higher combustible limit). About half way between these—about 10 percent— is the percentage at which an explosion is most vigorous. The percentages between these limits are regarded as the range of explosibility.

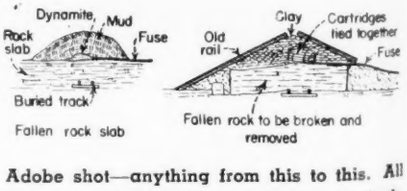
As noted, there are several ranges of explosibility for every explosive gas, but the one commonly taken is the range when the atmospheric pressure is that at sea level and the mine temperature is 60 deg., and when the explosive violence extends upward. But it must always be remembered that the flames of gases will extend with self-perpetuating violence at an augmented range if the pressures and temperatures are raised, as well they may be in a machine inclosure, in a shothole or in an area sealed by stoppings or shut in by rising water, as when a fire is fought by flooding.

Also, remember that probably any percentage of methane will burn but not perpetuate its burning after the source of heat is removed or fails to follow into the gas. Any methane that is near the flame of an oil safety lamp always will be burned though not necessarily exploded.

Adobe Shots

Q.—What is an "adobe" shot, or "mud-cap" shot?

A.—A charge of dynamite, or other high explosive, fired in contact with the surface of the piece of rock that the shotfirer desires to break. This explosive is covered with a large wad of wet mud, wet earth or sand, no borehole being used to confine the explosive within the rock. The slight confinement of the explosive by the mud or other plastering material permits part of its energy to be transmitted to the rock in the form of a blow (see illustration).



Adobe shot—anything from this to this. All bad in explosive dust, methane or both.

New Timken Bearing Equipped Cars For A New Mine In A New Coal Field

The development of the new Feds Creek Coal Co., Inc., mine in Pike County, Kentucky, opens up a new and important coal producing area.

Operation of the mine was started on October 15, 1945 and at the present time production is approximately 1400 tons of coal per day. A much larger daily tonnage is anticipated as the mine develops.

Mine car equipment now consists of 150 Enterprise stub axle cars of the rotary dump type, 4 ton capacity, mounted on Timken Tapered Roller Bearings. More cars of course will be needed as production climbs towards its peak.

The importance of this new coal area is further emphasized by the fact that the Norfolk & Western Railroad has constructed several miles of new track to serve the new mine, which is expected eventually to become one of the largest coal mines in Kentucky.

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TAPERED ROLLER BEARINGS

A mud cap may be placed with equal effect on top or to one side or even under a rock, if the explosive element is kept in place by a support until firing. The word "adobe" (pronounced ur-dough-bee), a Spanish-American word, means "brick," and hence has been, and still is, applied to the mixed earth or clay from which such bricks are made. Adobe shots are called also 'dobie and sandblast shots as well as mud-cap shots. Sometimes they are fortified by placing rails or other burdensome material on the shot, which makes the shot more effective but, wherever it can blow out, more dangerous also.

Where and Why Hazardous

Q.—Where and why are adobe shots dangerous?

A.—Such shots are a little less dangerous in mines producing incombustible minerals or minerals the dust of which is not explosive, such as anthracite, unless methane or perhaps other explosive gas is present, which the explosion might ignite. In the few cases where adobe shots are used in anthracite mines, the shots are light, because the material shot is not rock and the coal already is shattered and free in almost all directions. In this instance, the danger is that the adobe shot may be located in a high place accessible only to methane, which naturally rises to such places. As satisfactory tests of the atmosphere in such locations cannot be made, firing of such shots is likely to be suicidal or worse.

It might be permissible to use such a shot in trimming a rock tunnel quite remote from bituminous or lignitic coal unless the dust of such coal is brought in by the cars used for rock loading or carried in by the air current. But in all bituminous mines, adobe shots are and have proved extremely dangerous. The absence of methane in the air does not make the shot safe if coal dust is present.

The fact that rock, not coal, is being blasted by such shots does not assure safety. The flame of the explosive, especially dynamite, will ignite any methane or coal dust near the shot. It is the old story: "It can't happen here," but it does. The desire to save time that drilling a hole and tamping the shot would involve makes the adobe shot attractive, but fatal to the shotfirer. The explosive delivers its blows in all directions, and the blow against the supporting rock may give the desired fragmentation.

Wasteful, So More Is Used

The inefficiency of the adobe shot and the ease with which a heavy charge is positioned invite the shotfirer who desires results to use a heavy charge—often a much bigger charge then he would think of using in a properly drilled, charged and tamped shothole. Such a shot, which necessarily blows out (it can do nothing else), jeopardizes everyone in the mine. Soft-coal miners should leave such inadequately protected shots to metal miners, who mine inexplosive materials and have no methane, but they rarely use them because they are so ineffective.

Mine Foremen, Pa., Bituminous

Methane Calculations

Q.—(a) In a section where coal is loaded by machines, working three shifts daily, eight headings are being driven side by side into virgin coal, and in so doing they liberate 288,000 cu.ft. of methane every 24 hours. If the quantity of fresh air directed into these headings is 10,000 cu.ft. per minute, what will be the percentage of methane in the air current after it passes through the last working place? (See illustration.)

(b) What effect, if any, would this have on the flame of a safety lamp?

(c) What quantity of methane liberated per minute would just suffice to make the mixture explosive?

(d) Under part (a) how much air would have to be added to reduce the methane content to one half of 1 percent? Show in each case how you arrive at your conclusions.

A.—(a) Reducing the quantity liberated in 24 hours to the quantity freed per minute:

288,000 cu.ft. in 24 hours
$= 288{,}000 \div (24 \times 60) = 200$ cu.ft. per minute.

As 10,000 cu.ft. of fresh air is driven into these headings per minute, the quantity of the mixture of air and methane in the return will be $10{,}000 + 200 = 10{,}200$ cu.ft. per minute, and the proportion of methane will be $200 \div 10{,}200 = 2 \div 102 = 0.0196$. Multiplying by 100—that is, jumping the decimal point over two digits to the right to get a percentage instead of a proportion—0.0196 becomes $001.96 = 1.96$, almost 2 percent.

Effect on Flame

(b) With about 2 percent of methane, the flame of the lamp will elongate and a pale blue cap about ½ in. high will appear on the top of a reduced or non-luminous flame.

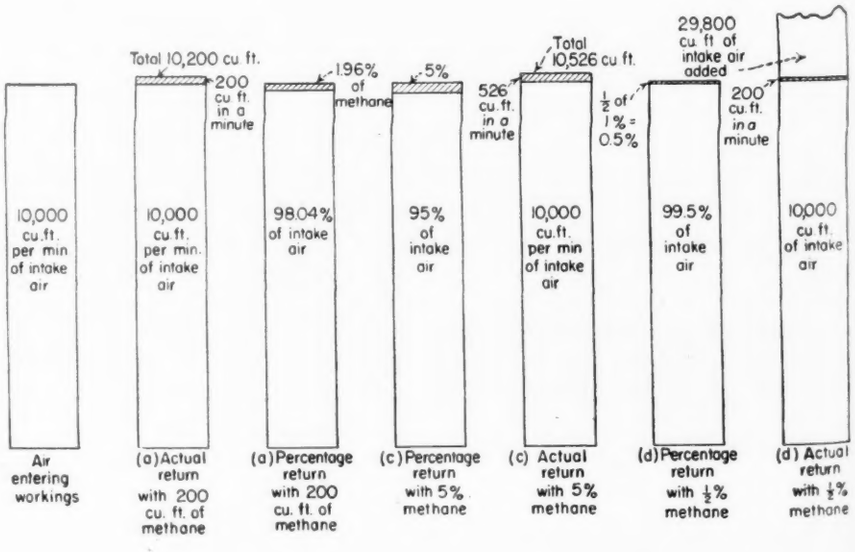
(c) In determining the quantity of methane liberated per minute that would just suffice to make the mixture explosive it should be recalled that the smallest quantity of methane that will explode in a mixture of methane and air is 5 percent. With that methane will be associated $100 - 5 = 95$ percent of fresh intake air, completing the 100 percent of mixture. As no air has disappeared, the figure representing intake air, which before mixture with methane was 100 percent air, has been decreased to 95 percent solely by the addition of methane, which has increased the volume of the mine atmosphere so that it is now more than 100 percent as great as it was when it entered the section of the mine under consideration. Evidently, the volume of the mixture must be as many times larger than the volume of original air as 100 is larger than $95 = 1.0526$.

Consequently, the volume of mixture will equal 1.0526 × the volume of the intake air, which is 10,000 cu.ft. So the volume of the air-methane mixture will be 10,526 cu. ft., of which air will occupy 10,000 cu.ft. and methane 526 cu.ft. Thus the quantity of methane needed to make the mixture explosive is either 526 cu.ft. as added to intake air or is 326 cu.ft. as added to the mixture as described in part (a), which already has 200 cu.ft. of methane.

Dilution to 0.5 Percent

(d) This part of the question requires that the content which is in part (a) 1.96 percent shall be reduced by the addition of more fresh air to a half of 1 percent, which is the same as 0.5 percent. It asks how much of this additional air will be needed.

When we have such a content of methane as required, 99.5 percent of air for every 0.5 of the former gas. Hence, we need to find how many times 0.5 will go into 99.5: $99.5 \div 0.5 = 199$. So we shall need 199 times as much air as methane. We have 200 cu.ft. of methane per minute, as shown in the answer to question (a), so it is clear that the quantity of air needed will be $199 \times 200 = 39{,}800$ cu.ft. per minute. But 10,000 cu.ft. was supplied, so we shall need 29,800 cu.ft. more, which is the answer required to part (d).


Total 10,200 cu ft.
200 cu ft. in a minute
1.96% of methane
5%
Total 10,526 cu ft.
526 cu. ft. in a minute
½ of 1% = 0.5%
29,800 cu ft of intake air added
200 cu. ft. in a minute
10,000 cu.ft. per min of intake air
10,000 cu.ft. per min. of intake air
98.04% of intake air
95% of intake air
10,000 cu.ft. per min of intake air
99.5% of intake air
10,000 cu ft. of intake air
Air entering workings
(a) Actual return with 200 cu. ft. of methane
(a) Percentage return with 200 cu. ft. of methane
(c) Percentage return with 5% methane
(c) Actual return with 5% methane
(d) Percentage return with ½% methane
(d) Actual return with ½% methane

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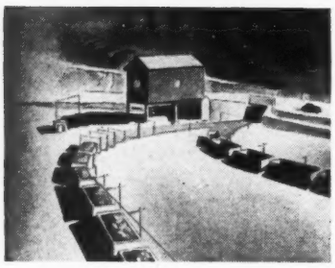
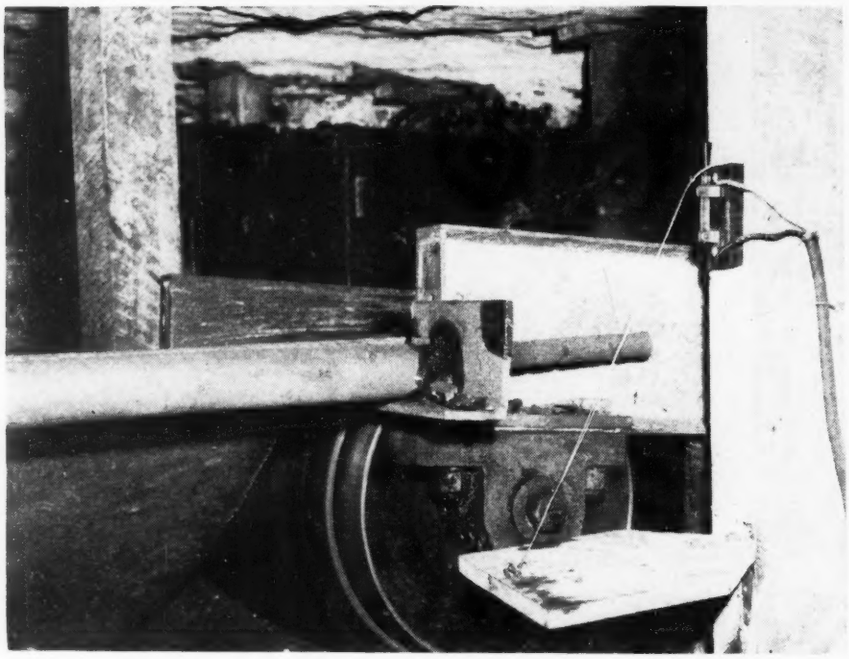


Operating Ideas

Switch Stops Spillage at Transfer Station



SPILLAGE OF COAL at a belt-transfer station automatically stops the secondary belt at the North Diamond mine, West Kentucky Coal Co., Madisonville, Ky.

The mechanical interlocking contrivance, shown in the accompanying illustration, consists of a hinged shelf which; when forced down by the weight of a small amount of coal, opens a small knife switch. When the switch is opened the holding coil of the starter is de-energized and the secondary belt caused to stop. This prevents the secondary belt from piling up coal at the transfer point after the primary belt has stopped. After the device has operated it must be reset manually before the secondary belt can be started, at which time the transfer station can be examined.

Coal falling onto the hinged shelf opens the knife switch, shutting down the secondary belt.

Bracket Holds Drill on Cutter Bar

TO SPEED UP DRILLING in development or narrow work, when the cutting crew also does the drilling, Vincent Colaianni and Mike Horuyak, Piney Fork No. 1 mine, Hanna Coal Co., Piney Fork, Ohio, have developed the drill bracket shown in the accompanying illustration from a recent issue of the Hanna Coal News. The bracket does away with the drill post formerly employed and hastens the process of getting drilling under way. It fits over the end of the cutter bar when revolved to shearing position. The bit blocks keep it from moving under the thrust of the auger and the usual post fixture, on the end of a shaft welded to the bracket proper, permits tilting the drill up or down in regular fashion.

The inventors put the drill bracket to use at Piney Fork No. 1.

A NEW SIZE

A-A-Frame
20-140 G. P. M.

A-Frame
25-350 G. P. M.

B-Frame
200-1200 G. P. M.

B-C Frame
800-1200 G. P. M.

C-Frame
400-1900 G. P. M.

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D-Frame
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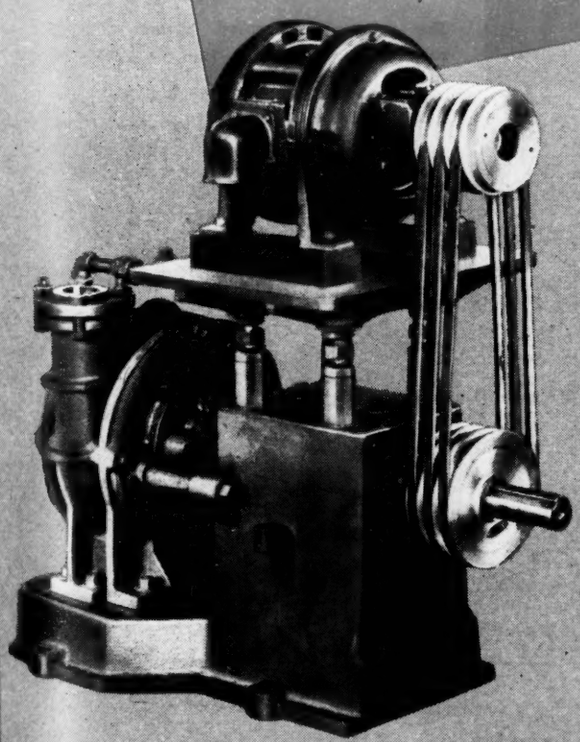
HYDROSEAL PUMP for those "in between" Jobs



Occasionally, mines have found that the B-Frame Hydroseal Pump was too small and they ordered a C-Frame, which was really too big for their pumping job. Now, these conditions can be met by the new B-C-Frame pump, operating at the best speed for minimum wear. This pump is, of course available in Belt Drive, Overhead Motor Drive and Direct Drive Types. Naturally, it is priced between the B- and the C-Frame Hydroseal. Write for Hydroseal Pump Catalog No. 140.

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

Correspondence from United States and Canada to

ALLEN-SHERMAN-HOFF CO., 231 S. 15th St., Phila. 2, Pa.

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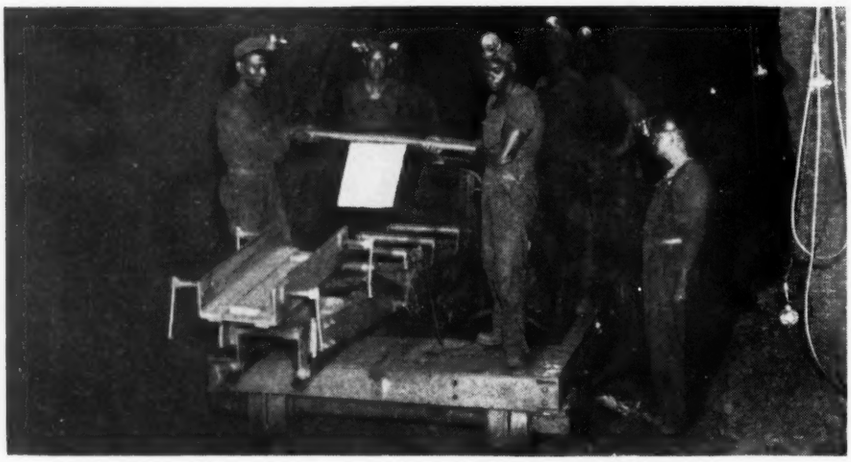
A-S-H EXPORT CO., 271 Madison Ave., New York 16, N.Y.

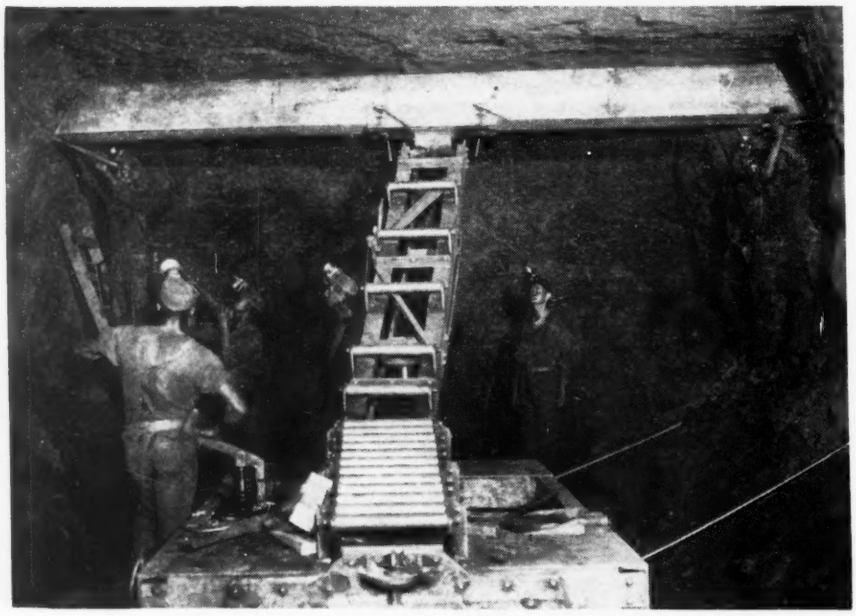
CABLE ADDRESS: ASHEXPOR, NEW YORK—BENTLEY'S CODE

Either of above offices will direct you to nearest representative

Timber-Setting Truck Saves Labor, Reduces Accidents



The crossbar is rolled along the boom to the cradle where it is held by four clamps.



TIMBER-SETTING TRUCKS designed primarily to lift cross collars in place when timbering headings are saving labor and reducing accident hazards in one of the country's ore mines.

The machine, shown in the accompanying illustrations, consists of a specially built car with a 7-ft. 4-in. wheelbase on which is mounted a turntable with a 10-ft. boom, conveyor rollers, hydraulic jack and hand pump. The over-all length of the truck with the boom in the horizontal position is approximately 18 ft.

In using the unit, 12x12-in. timbers varying in length from 14 to 22 ft. are first cut to length and the ends shaped. Then the timber is rolled onto the cradle at the end of the boom while the boom is in the horizontal position. After it is in place it is clamped by screws in the sides of the cradle. The cradle is pivoted so that it may be rotated 360 deg. in a horizontal plane and tilted in a vertical plane approximately 45 deg. either side of the vertical axis.

The boom is raised by a hand-operated hydraulic jack. Approximately two minutes are required to raise the boom from a horizontal position 4 ft. above the track to a height of 12 ft. As the boom is raised, a ratchet device automatically engages to prevent the boom from dropping in case of a failure of the hydraulic system. The turntable allows the boom to be moved manually 45 deg. either side of the longitudinal axis in case the track is not in the center of the heading or the timber is not exactly centered in the cradle. The time required to set cross collars weighing up to 900 lb. has been cut more than 60 percent, with much less effort, fewer men and with a greater degree of safety compared to the old methods.

Timber-setting truck holds crossbar against roof until it is anchored on the rib pins.

The manually-operated hydraulic pump raises the boom in approximately two minutes (below).

Important Too!

Men well informed on mining matters share their experience with one another at scheduled meetings. But seldom do their papers include information on many of the smaller operating ideas. Yet these ideas, often considered to be insignificant, are making tidy savings for their users. This information, we feel, is important too and should be published. Good ideas help to make a healthier industry. If yours is a mechanical, electrical, operating or safety idea—send it in. If accepted, Coal Age, upon publication, will pay you $5 or more for each.

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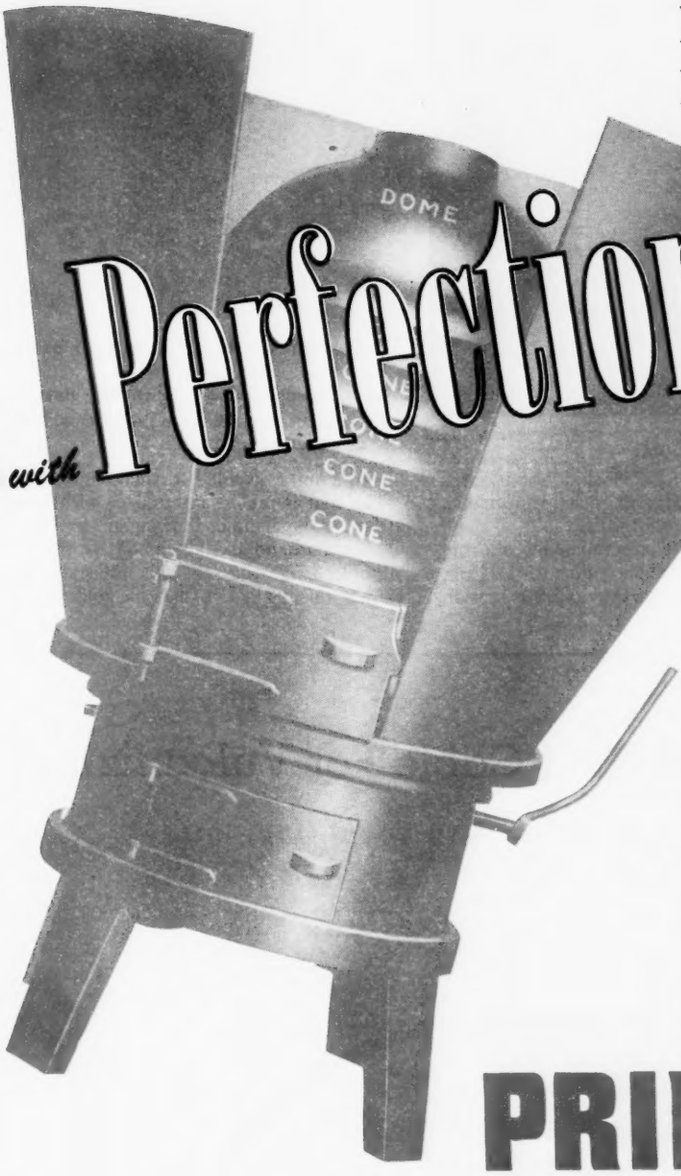
GET MORE DRY SAND *with* Perfection CONE STOVE SAND DRYER



Cut shows section of Hopper removed to show general arrangement.

Bigger mine cars—heavy loads—accelerated production—all these require faster, more efficient locomotive operation. You'll need plenty of *dry* sand for that . . . and you can count on having it in abundance if you have a "Perfection" Cone Stove Sand Drier on the job!

A "Perfection" Drier will turn out really dry sand at one-half the usual cost, and will produce it at a rate of 8 to 10 tons in 8 hours. If your operations require more we can increase the capacity of this same drier to 12 to 14 tons. Write today for complete information on the "Perfection" Cone Stove Sand Drier.

PRINCETON
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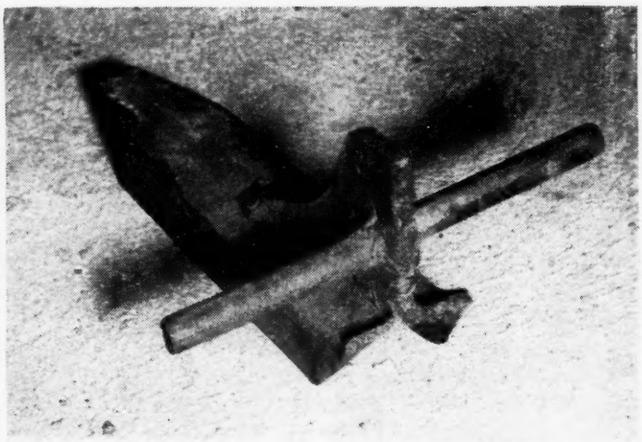
If it's perfection you want in a sand dryer . . . ask for "Perfection!"

Short Car Skid Saves Fingers



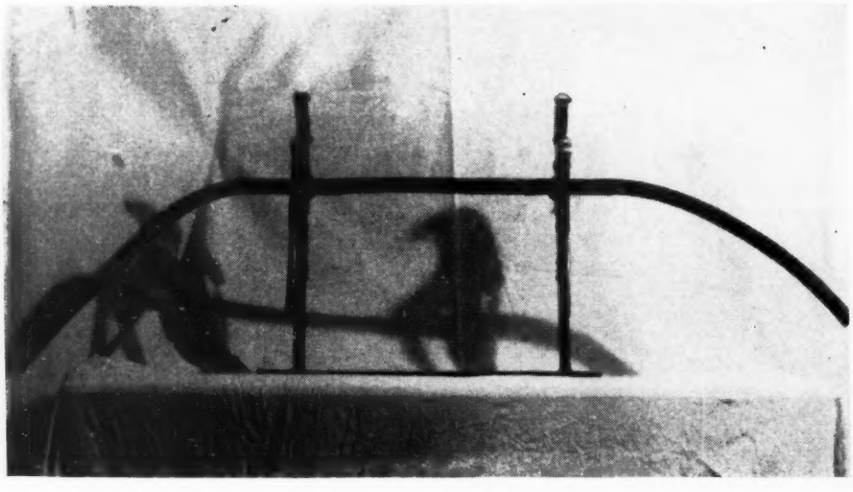
The skid has a double handle for use from either side of the car.

Emil Servant, master mechanic, demonstrates how easy it is to handle the skid with one hand.

Adoption of a short lightweight one-handed skid has reduced hand injuries in car handling, says Emil Servant, master mechanic, Lindley mine, Pittsburgh Coal Co., Canonsburg, Pa.

The double-flanged skid, shown in the accompanying illustrations, uses a channel-iron section for a runner. The vertical rib, against which the wheel of the car rests, carries the double-extension handle and is welded to the channel. The skid is so compact and light that it can be inserted or withdrawn by one hand. The position of the handle, convenient for use on either side of the car, keeps the hand and fingers out of the danger zone. Because of the double flange the skid will not slide through a frog. This feature is helpful in blocking cars on grades in the panel entries.

Clamps Hold Cable For Vulcanizing



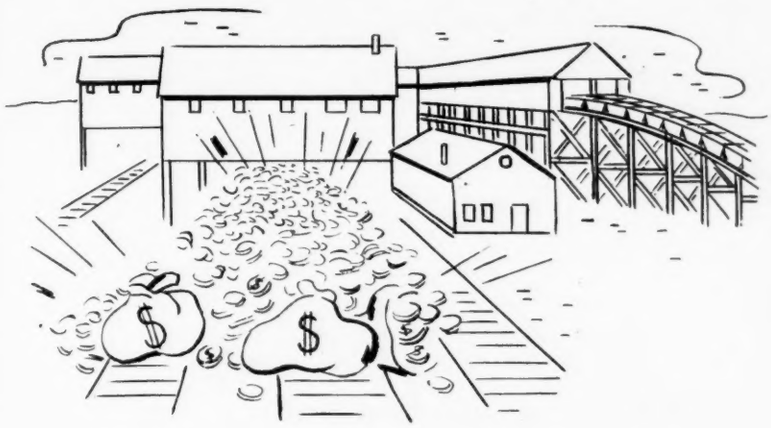
The cable is held by two clamps mounted on a single stand, (left). The bottom shoe can be adjusted to suit the size of the cable, (right)

Special clamps facilitate the application of tape to machine cables during the vulcanizing operation, states Fred J. Beck, Gallitzin, Pa.

The body of the clamp, shown in the accompanying illustrations, is made of $\frac{3}{8}$x2-in. strap iron shaped to accommodate the other parts of the clamp. The cable is held firmly at each clamp by two shoes. The bottom shoe, the longer of the two, is adjusted up and down by a sliding support held in position with a flat strap and set screw. The top shoe is fastened to a lever handle which, when pulled toward the operator, moves the top shoe down on the cable. The lever handle locks in the closed position firmly gripping the cable. By adjusting the shoes the clamps can accommodate cable from $\frac{5}{8}$ to $1\frac{1}{2}$ in. in diameter.

THE *What, Where, Why* AND *How* OF O-B SAFETY AND CONTROL EQUIPMENT

Give your coal a good start to *Greater Profits*



Insure continuous production at the face with O-B Mine Tested Safety and Control Equipment

Dollars pour out as the coal rolls in! The less it costs to produce a ton of coal, the greater are your profits. Give your coal a good start on its road to the tipple by keeping your mechanized equipment running at peak efficiency... by insuring an adequate flow of controlled power at the face... by protecting against production-robbing power breakdowns.

A system of O-B Safety and Control equipment can provide such protection at surprisingly low cost. Shown here are the devices you need to distribute, control and protect your power flow at the face. Study them, giving special attention to the following pages which tell WHERE, Why & How this equipment should be used. Why be satisfied with less? Install the best! Give your face machines a break with O-B Safety and Control equipment.

FUSED TROLLEY TAPS

GROUND CLAMPS

CABLE TAPS

SAFETY FEEDER SWITCHES

DISTRIBUTION BOXES

MOTOR STARTERS

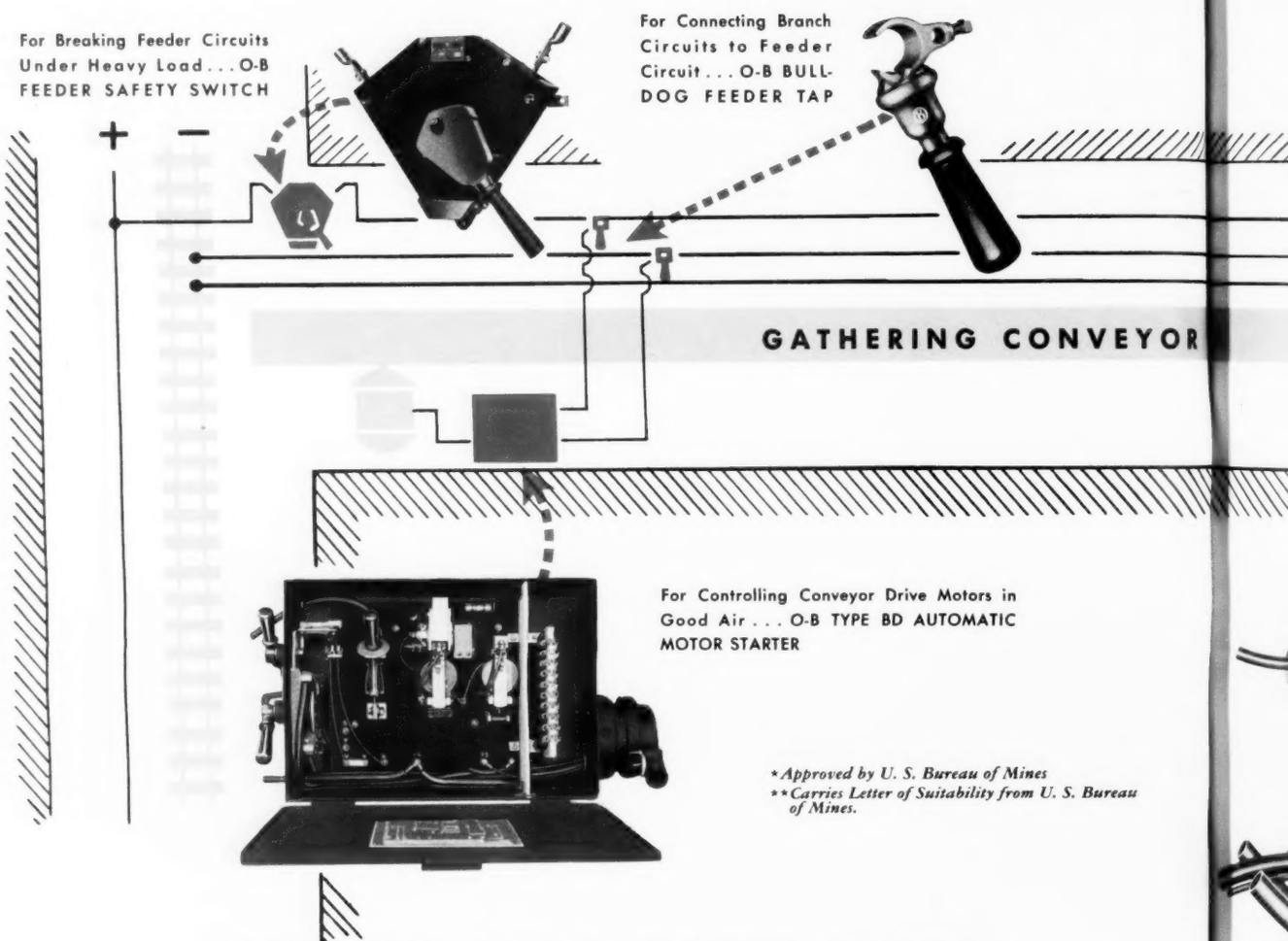
SPLICE BOXES

MECHANO PLUGS

THE *Where* AND *How* OF O-B SAFETY AND CONTROL EQUIPMENT

Distribute...

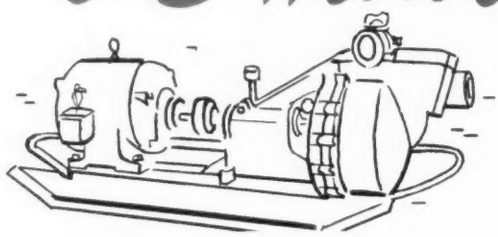
YOUR VITAL POWER FLOW AT THE FA


For Breaking Feeder Circuits Under Heavy Load . . . O-B FEEDER SAFETY SWITCH
+
−
For Connecting Branch Circuits to Feeder Circuit . . . O-B BULL-DOG FEEDER TAP
GATHERING CONVEYOR
For Controlling Conveyor Drive Motors in Good Air . . . O-B TYPE BD AUTOMATIC MOTOR STARTER

**Approved by U. S. Bureau of Mines*
***Carries Letter of Suitability from U. S. Bureau of Mines.*

PUMPS AND FANS NEED

O-B Motor Starters, Too!

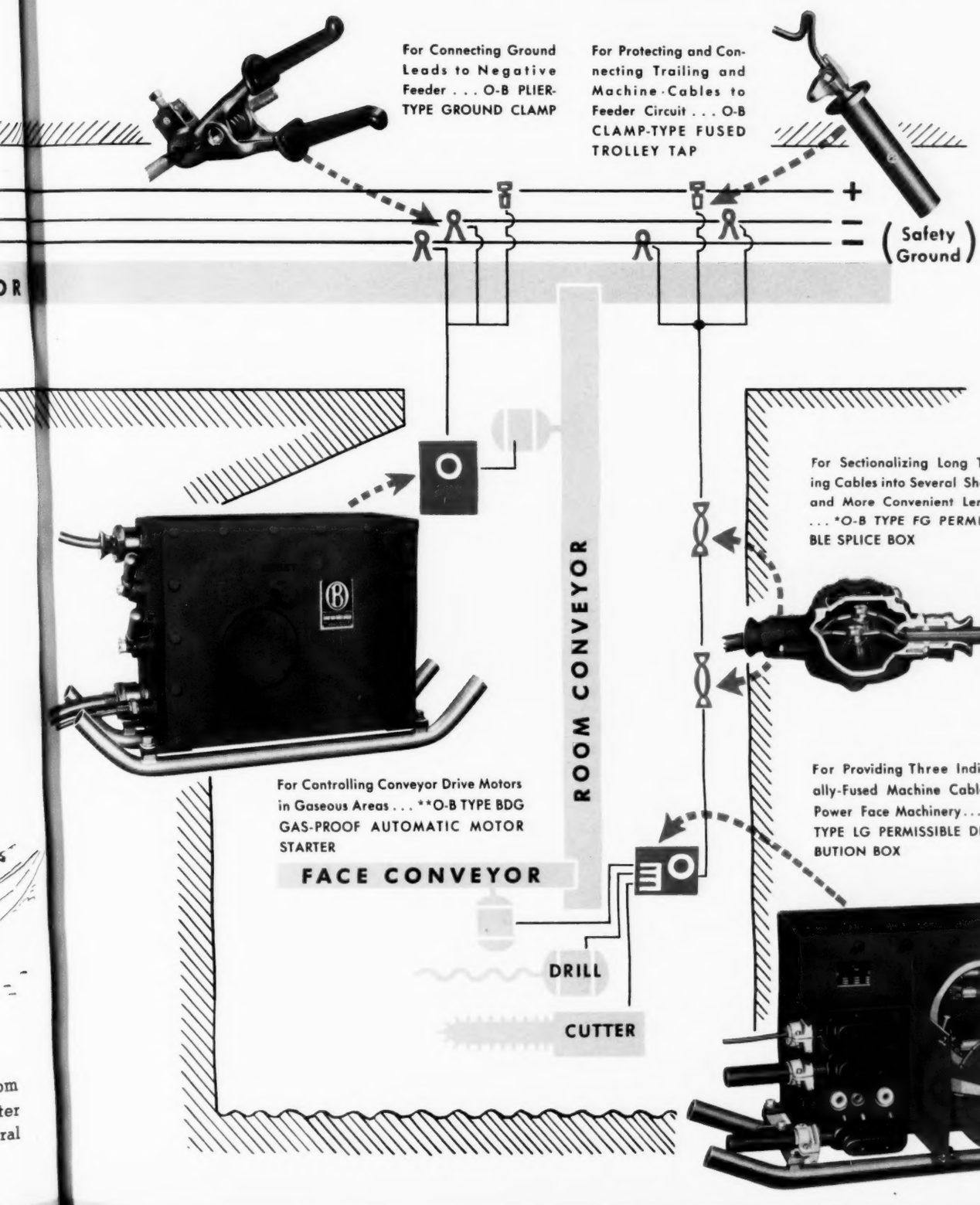


You can forget about unattended pumps. An O-B Motor Starter will operate automatically from a float switch or may be controlled from a remote station.

No need to waste steps traveling to and from distant fan installations. An O-B Motor Starter will operate them automatically from a central control station.

Control... Protect

FACE WITH O-B SAFETY & CONTROL EQUIPMENT

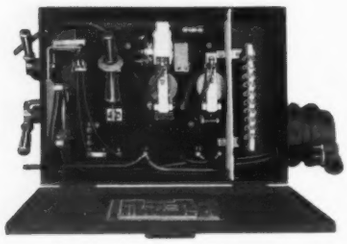

For Connecting Ground Leads to Negative Feeder . . . O-B PLIER-TYPE GROUND CLAMP
For Protecting and Connecting Trailing and Machine Cables to Feeder Circuit . . . O-B CLAMP-TYPE FUSED TROLLEY TAP
+
=
=
(Safety Ground)
For Sectionalizing Long Trailing Cables into Several Shorter and More Convenient Lengths . . . *O-B TYPE FG PERMISSIBLE SPLICE BOX
ROOM CONVEYOR
For Controlling Conveyor Drive Motors in Gaseous Areas . . . **O-B TYPE BDG GAS-PROOF AUTOMATIC MOTOR STARTER
FACE CONVEYOR
For Providing Three Individually-Fused Machine Cables to Power Face Machinery . . . *O-B TYPE LG PERMISSIBLE DISTRIBUTION BOX
DRILL
CUTTER

THE *Why* OF O-B SAFETY AND CONTROL EQUIPMENT

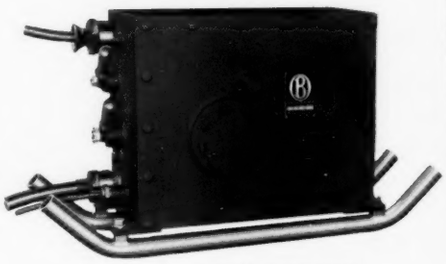
PUT THESE PROFIT-BOOSTING EXTRAS OF O-B SAFETY & CONTROL EQUIPMENT TO WORK FOR YOU!

O-B MOTOR STARTERS

Start motors smoothly and evenly regardless of load .... stop commutator flashover .... cut out instantly upon power outage; re-start automatically ... may be controlled from remote stations .... protect against damaging overloads and short circuits.



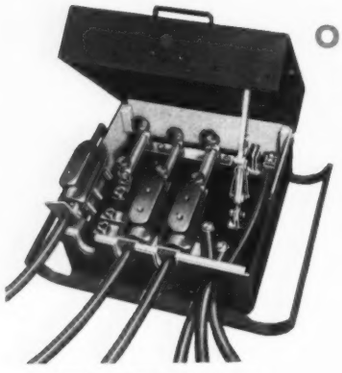
TYPE BD ... FOR OPEN MINES



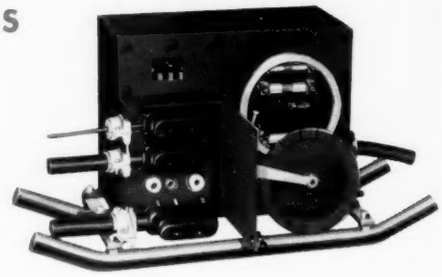
TYPE BDG ... FOR GASEOUS MINES

O-B DISTRIBUTION BOXES

Act as "portable switch panel" for face machines .... handle up to three individually-fused branch circuits from one trailing cable .... offer emergency means of cutting off power under full load .... provide back-up protection for machine controllers and cables.

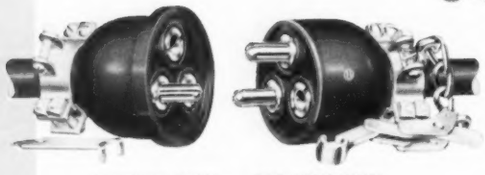


TYPE B ... FOR OPEN MINES



TYPE LG ... FOR GASEOUS MINES

O-B CABLE CONNECTORS



MECHANO PLUGS ... FOR OPEN MINES

Break up long trailing cables into shorter and easier-to-handle "extention" lengths .... protect unused sections against mechanical damage .... are simple to install underground.

TYPE FG SPLICE BOX ... FOR GASEOUS MINES

Let us help you PLAN A POWER CONTROL AND PROTECTION SYSTEM FOR YOUR MINE

Mine conditions vary necessitating a great number of different power control and protection arrangements. No one plan will fit all requirements. Insure the proper functioning of your operation by enlisting the aid of an O-B control engineer. He'll be glad to help you plan a system tailored to meet your individual requirements. No charge or obligation, of course. Ask for this service.

2707-M

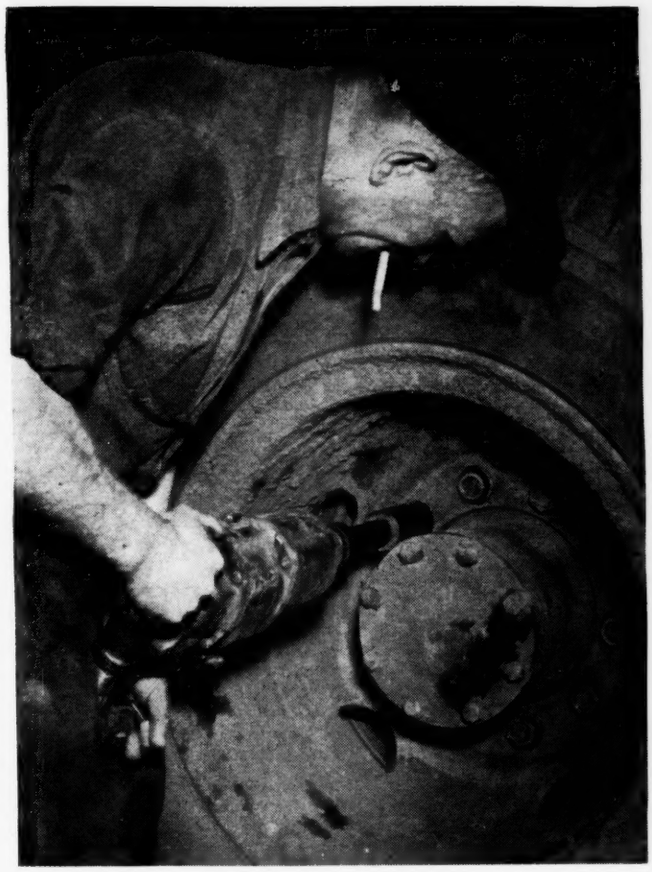
Printed in U. S. A.

Ohio Brass

MANSFIELD, OHIO

Ohio Brass Co., Ltd., Niagara Falls, Ontario

Air Wrench Speeds Tire Changing



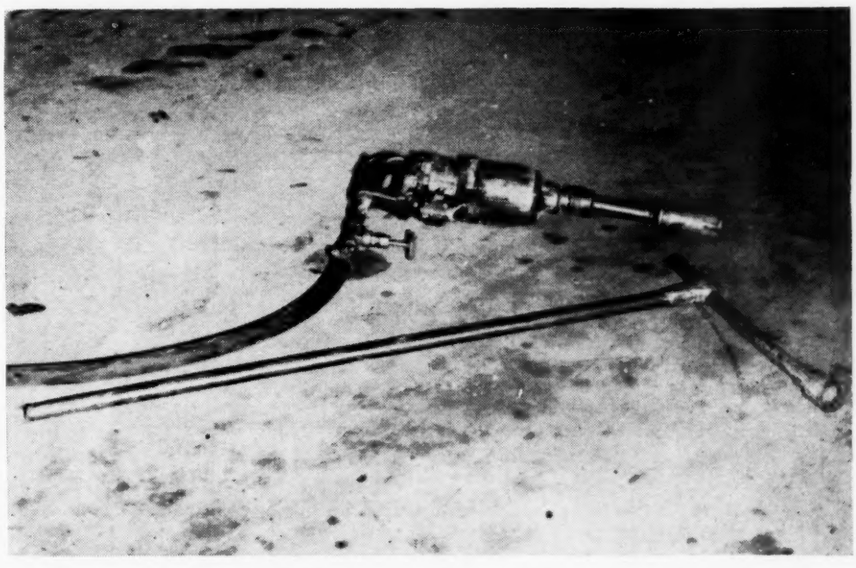
The air-driven wrench, which has speeded up the tire-changing operation, is run by one man.

This compressor furnishes air at 165 lb. per square inch for operating the wrench.

An air-driven wrench enables a two-man crew to change truck tires in the garage in one third the time required when a hand wrench was used, states Charley F. Smothers, superintendent, Sentry Coal Mining Co., Madisonville, Ky.

The equipment, shown in the accompanying illustrations, functions on a pressure of 165 lb. per square inch and combines power and speed to effect a reduction in the time needed for changing tires. Before, two men used a hand wrench with a 4½-ft. handle to back off ten 1½-in. nuts required to release the outside dual rim. One man guided the wrench while the other applied the pressure to the handle. This method required 30 to 60 minutes to change only the outside dual tire whereas mechanics at the garage report that in most instances it is the inside tire that must be changed. On the 30-ton semi-trailers, 14.00 x 24 heavy-duty 20-ply tires are used.

Now, two mechanics using a Model AR Chicago-Pneumatic Power-Vane wrench can change the same tire in 15 minutes. This wrench, with interchangeable sockets with shank extensions, can also be used in changing leaf springs and for general body work. Air at 165-lb. pressure is supplied by a Type 4YC Westinghouse compressor driven by a Type KG 10-hp. General Electric Tri-Clad induction motor.



How the new and the old wrench compare.

ARE you getting maximum tonnage and efficiency out of your available manpower? Why not profit by the experience of hundreds of Mine Operators all over the world who are using Cincinnati Chains . . . double-ended reversible Bits . . . and Cincinnati sturdy Cutter Bars? Their experience is the same . . . greater tonnage . . . less power consumption . . . satisfied operators . . . less maintenance and a saving in valuable man hours. Cincinnati Coal Cutting Equipment, heat treated, and drop forged, is engineered for efficient low cost performance even under adverse cutting conditions.

CINCINNATI STANDARD CHAIN

Cincinnati Standard Chain accommodates Stanex Holder and Bit or regular $\frac{1}{2}$" x 1" bit. Similar in design to the famous Duplex Chain.

STANEX HOLDER AND BIT

The Stanex Holder with factory made double-ended Stanex Bit fits all chains that accommodate the regular $\frac{1}{2}$" x 1" bit.

CINCINNATI CUTTER BAR

Specially designed to meet hardest cutting conditions . . . to withstand bending stresses. Constructed to fit all popular mining machines . . . both regular and thin kerf.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO

News Round-Up

Rail and Power Service Crippled As Lewis Waits Out Welfare Fund

An embargo on rail freight movements, excepting foods, fuels, livestock and a few other vital items, and a 25 percent cut in passenger service effective May 10 and a 50 percent cut effective May 15 were clamped on the nation's coal-burning railroads by the Office of Defense Transportation May 2 and 3 as John L. Lewis led bituminous miners into the sixth week of their strike and threatened a stoppage in anthracite mines. In addition, severe brown-out regulations, power curtailments and measures to protect public health were imposed in Illinois, Indiana, Pennsylvania and the nation's capital, and were under consideration elsewhere. The embargo orders, issued in two letters sent by Monroe Johnson, director of ODT, to J. J. Pelley, president of the Association of American Railroads, and J. M. Hood, head of the Short Lines Association affected an estimated 75 percent of the country's passenger mileage.

Burlington Railroad officials ordered cancellation as of May 6 of about 20 trains serving the Middle West, and the Illinois Central Railroad announced that it would soon discontinue operation of 21 through trains. Four passenger trains daily between Chicago and St. Louis were discontinued voluntarily on May 3 because of critical coal shortages.

The Carnegie Steel Corporation, major subsidiary of the United States Steel Corporation, cut back operations to 9 percent of capacity as of May 6, the lowest rate at which it has ever worked except during the complete shutdown of the steel strike. Industries in 22 counties in Indiana were asked to confine use of electric current to 24 hours from Monday through Friday of each week, and ornamental and display advertisements were banned. Similar restrictions were imposed in Illinois. In Chicago Mayor Edward J. Kelly appointed an emergency commission and promised seizure of coal stocks if necessary, as 700,000 tenants and employees of commercial elevator buildings were threatened with walkups. Public service power companies in Philadelphia and nearby areas requested customers to cut their use of current drastically, and resumption of wartime brown-outs elsewhere appeared imminent.

With Lewis still adamant, the Civilian Production Administration May 8 ordered increased use of non-coal fuels east of the Mississippi, asked utilities to curb power use and warned that gas use might also be restricted. Meanwhile, the rate of industry closing increased rapidly.

Calling the strike "a national disaster," President Truman on May 4 warned that damage to reconversion will take months to mend. The White House statement was based on a report made by the Office of War Mobilization and Reconversion and derived from data gathered by the Civilian Production Administration. Pressure favoring government seizure of the mines increased in the Senate, with Senators Lucas (Illinois), Byrd (Virginia) and Ellender (Louisiana) voicing alarm at Lewis' ruthless tactics. Legislation to forbid royalty payments as demanded by Lewis was introduced in the House and hearings were scheduled for May 7.

Anthracite Strike Set

Progressive miners walked off their jobs in Illinois at midnight April 30. Meanwhile anthracite operators notified Lewis that their negotiating committee had been appointed and was prepared to meet him and his committee to discuss new contract terms. Meetings probably will be held in New York City beginning May 10. Lewis already has served notice that the 75,000 anthracite miners would strike when their present contract expires May 31, unless their demands were met before that time. Anthracite demands followed closely the bituminous pattern, including an unspecified wage increase, shorter hours, a welfare fund and improved safety conditions.

Joint conferences in the bituminous industry were resumed April 29, after a breakdown engineered by Lewis on April 10. Operators on returning to Washington at Secretary of Labor Schwellenbach's call found that Lewis had switched the game from football to shuffleboard during the conference halt. Having bored himself by insistence on safety measures and a welfare fund, Lewis blocked renewal of negotiations by demanding settlement of claims for holiday pay carried over from last year. By Lewis' own motion, carried unanimously in joint conference March 27, computation of overtime pay for holidays had been referred to the respective districts for settlement. Charles O'Neill, spokesman for the operators, when asked on May 2 whether progress had been made since resumption of joint conferences, said "there is nothing more definite than there was March 12."

Staging a Gromyko walk-out that long paralyzed bituminous negotiations, John L. Lewis on April 10 indicated his willingness to shut down the nation's reconversion program to force blanket acceptance of his demands for: (1) payment of royalties on coal tonnage into a union-administered health and welfare fund, (2) substitution of federal mining inspectors' recommendations for state mining laws, (3) inclusion of foremen and supervisors in the new contract and (4) elimination of all no-strike, penalty and discipline clauses contained in former agreements.

Following the breakdown of negotiations government activity increased. Secretary of Labor Schwellenbach met negotiating committees of the operators and the United Mine Workers in separate conferences on April 11, stating that his aim would be to get the parties to "discuss the same thing at the same time." After these conferences Schwellenbach reported as follows:

"The operators stated that they were willing to meet in joint conferences. Mr. Lewis did not state that he was unwilling to meet in joint conference, but he did state that he felt the joint meetings such as they have had in the last five weeks would accomplish nothing so long as the operators refused to agree to any of the proposals he had made."

President Truman and John W. Snyder, Chief of the Office of War Mobilization and Reconversion, took a hand in the deadlock when the President called in Lewis and Schwellenbach for a 15-minute conference on April 20. After the meeting it was announced that there had been "no conclusive result," although Lewis was "jovial" when he left the White House conference and Schwellenbach "emerged smiling."

Meanwhile, with negotiations altogether bogged down, coal stockpiles were being drawn down. Railroads, steel mills and automobile plants faced shutdowns, and urgent requests for coal to meet pressing needs of the United Nations Relief and Rehabilitation Administration were turned down by Lewis. On April 17 the Ford Motor Co. in Detroit laid off 45,000 workers because of steel shortages. More than 60,000 unemployed in steel mills, railroads and other industries dependent on coal were reported on April 23, including 21,000 at the Carnegie-Illinois Steel Company's Pittsburgh district plants; and the U. S. Steel Corporation reported a loss of 340,000 tons of ingot production as of April 21. The Civilian Production Administration expressed the fear that most of the steel industry's blast furnaces would have to be banked if the coal stoppage continued into May.

The plea of F. H. LaGuardia, director-general of UNRRA, for 500,000 tons of coal per month to meet European relief demands

met with a prompt but unsatisfactory reply from K. C. Adams, editor of the *U. M. W. Journal*, who said "The miners don't own the mines. They possess no authority legally, financially or otherwise to order resumption of production." Ezra Van Horn, chairman of the Operators' Negotiating Committee, told LaGuardia that the mines had been shut down by the miners' "unilateral action."

While the stoppage continues, West Virginia miners alone are losing $5,700,000 weekly in wages, according to J. V. Sullivan, secretary of the West Virginia Coal Association. In addition the industry's sales volume has dropped $9,000,000 weekly, railroads are losing $7,000,000 in revenues, retailers $3,000,000, wholesalers $1,500,000, supply and equipment houses $1,200,000, the state treasury $120,000 in sales taxes on coal, and the federal government $150,000 in social security taxes, Sullivan pointed out.

In an address before the assembled representatives of Pennsylvania anthracite miners at Hazelton, Pa., April 24, Lewis charged the U. S. Steel Corporation with "holding the line against the United Mine Workers on any agreement on mine safety and human welfare," but he expressed the belief that the "fight for welfare and safety is won" in the bituminous industry. He warned that the bituminous miners, already in the fourth week of their strike, would remain idle for six months if necessary to win acceptance of their demands.

Replying to Lewis' charge that U. S. Steel was blocking agreement Edward L. Burke, speaking for the bituminous operators, attacked Lewis' effort to "shift the blame upon entirely innocent parties. If Mr. Lewis had shown anything like the good-faith desire evidenced daily by Mr. Harry Moses (U. S. Steel representative on the operators' committee) a wage agreement, properly safeguarding the rights of both mine workers and operators, could have been speedily negotiated," said Burke.

Lewis made his charges against U. S. Steel before about 400 delegates, representing nearly 75,000 anthracite members of U. M. W. A., who gathered at Hazelton Pa., to write their demands for a new agreement.

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New Developments Among Operators

Sale of the entire community of Van Lear, in Johnson County, Kentucky, by the Consolidation Coal Co. to O. G. Hinton, Pikeville attorney, and four associates, at a reported price of $300,000, was revealed Apr. 2, together with intention of the company to divest itself of other realty holdings in eastern Kentucky.

Increased stripping activity is expected with the reported transfer of 2,800 acres of coal land in Jackson County, southern Illinois, by W. J. Jenkins, president, Consolidated Coal Co., to his son, Stewart.

Purchase of the Birch Creek Coal Co., Brazil, Ind., by the Big Bend Collieries Co., Brazil, Ind., was announced Apr. 3. The Birch Creek strip pits will continue to be operated under that name, the new owners announced.

The Ayrshire Collieries Corp., Indianapolis, Ind., has acquired the mining property of the Chicago & Harrisburg Coal Co. at Danville, Ill., and reportedly will develop one of the largest and most strip mines in the middlewest, W. A. Endicott, superintendent of the company's Chinook mine, has been named superintendent of the new operation.

The Winding Gulf Collieries, Bluefield, W. Va., is reported to be starting construction of its new mine No. 4 immediately.

With the closing of the Baldwin mine of the Alpine Fuel Co., Baldwin, Colo., terminating a half century of mining because of the working out of the coal vein, L. D. Hardin, president of the company, is reportedly negotiating with the Rocky Mountain Fuel Co. for the reopening of its Kubler mine under lease.

The mines and mining committee of the Board of Supervisors of St. Clair County, Illinois, Mar. 29, asked a delegation of coal-mine operators to sponsor and finance the construction of a community coal washer, estimated to cost between $500,000 and $600,000, in an attempt to rehabilitate the county's mining industry.

Proposed development of one of the largest coal deposits in southern Alberta during the present year was outlined to the Alberta Legislature recently. It was revealed that the Highwood Western Railway Co. would be established as a subsidiary to a parent organization developing the coal field southwest of Calgary.

The company plans to start construction of a 42-mile standard gage rail line to the field this spring, connecting with the C.P.R. at Okotoks. Eventual production objective from the field is 5,000,000 tons a year to supply the Ontario and northwestern U. S. Markets, and coal sufficient for 40 to 50 years of operation is reported to be available.

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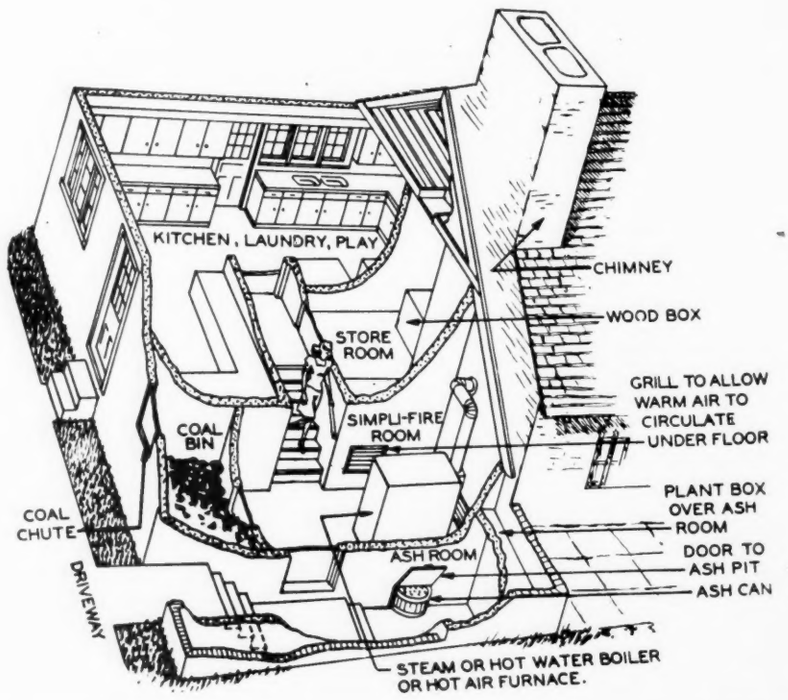
Anthracite Institute Shows "Answer Homes"

Stressing economy in construction and cleanliness and convenience in heating, designs for six "Answer Homes" that feature new departures in furnace and utility-room planning were displayed by the Anthracite Institute at a premier showing April 9 at the Waldorf-Astoria Hotel, New York City.

The heating room, which the Institute calls the "Simpli-Fire" room, is excavated only to the frost line, about 3½ ft. deep, saving the costs of full basement construction and waterproofing, yet providing comfortable space-heating, warm floors and streamlined ash removal. It furnishes coal storage space convenient to the driveway, easy access from the work area of the house and simplified removal of ashes, which drop below floor level into a small container directly underneath the furnace. The ash container is removed from the outside through a small door in the lower wall of the heating room, and it may be left inconspicuously in a sunken areaway concealed by a flower box or shrubs.

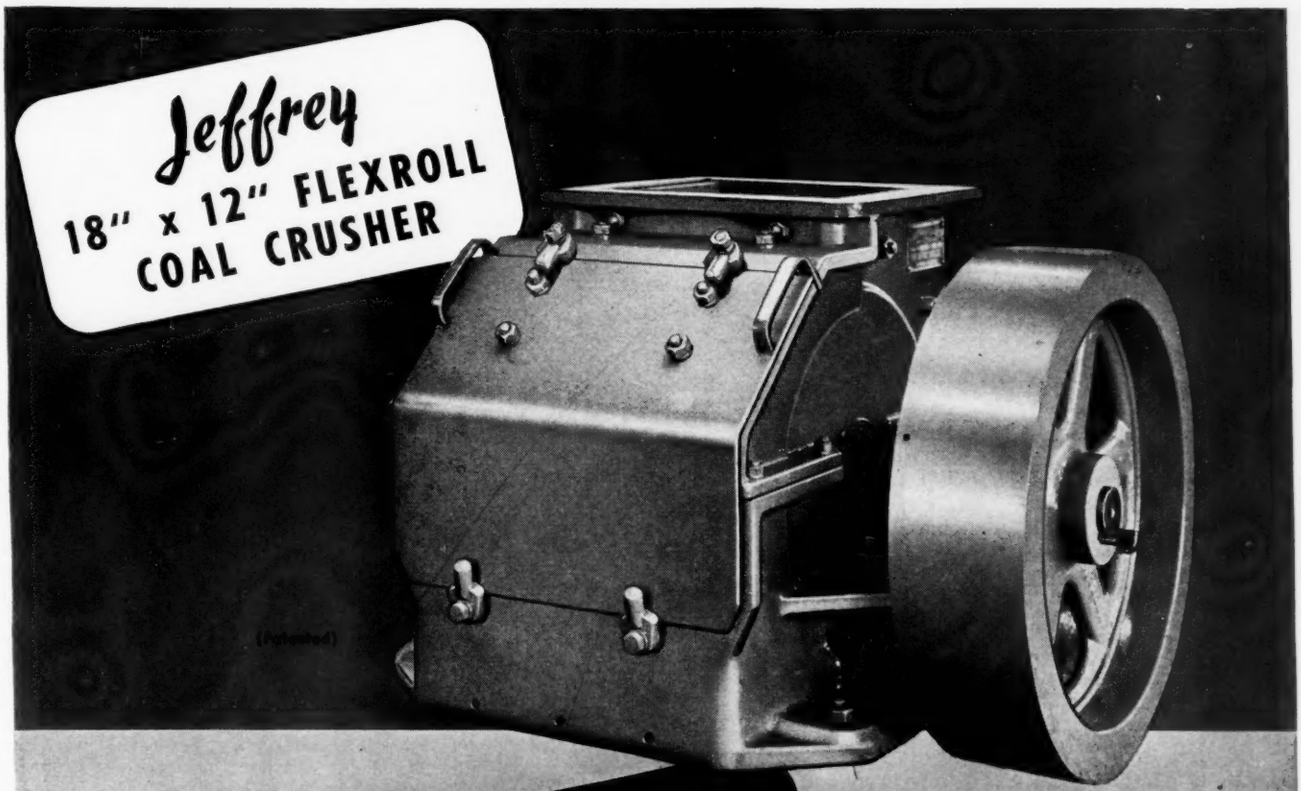
Floor heating is provided by the circulation of heated air from the heating room through grilles that lead to an 18-in. space between floor and ground, created by substantial but inexpensive pier construction. Any conventional system—forced hot air, steam or hot water—can be used to dis-



Scale model and architect's floor plan of "Simpli-Fire" room, as shown at Anthracite Institute's display of six "Answer Homes" at the Waldorf-Astoria Hotel in New York, April 9. Note grille for circulation of warm air under floors, and ash container in sunken areaway under flower box.

Jeffrey

18" x 12" FLEXROLL COAL CRUSHER



FOR CRUSHING LUMP TO STOKER SIZES IN ONE OPERATION

A new-type, small-capacity unit high in crushing efficiency but low in cost and maintenance. Control the top size of stoker coal by crushing oversize from screen with this low-priced crusher.

Send for Bulletin No. 277

THE JEFFREY MANUFACTURING COMPANY

ESTABLISHED 1877

tribute the main flow of heat through the home.

"These designs supply a part of the answer on how to save money and yet build soundly," declared Frank W. Earnest, Jr., president of the Institute, at an advance press showing of the house plans and a scale model. Savings up to 10 percent in construction costs may be expected, according to Mr. Earnest and Randolph Evans, of the architectural firm of Chapman & Evans, who designed the plans.

The exhibit at the Waldorf was the first of a series of showings scheduled for cities throughout the anthracite consuming area. Home builders, architects, coal dealers and others will be invited to future showings, which are tentatively booked for Philadelphia, Reading, Baltimore, Buffalo, Rochester, Syracuse, Albany, Springfield, New Haven, Providence and Boston. To publicize the "Simpli-Fire" room further the Institute will launch an extensive advertising program in architectural, building and coal trade publications and by direct mail to builders and prospective home owners.

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Belgium Faces Coal Deficit

BRUSSELS, Belgium—(McGraw-Hill World News Bureau)—In a review of measures being taken to strengthen his country's precarious economic position, the Belgium Premier revealed recently that coal production had fallen from 80,000 to 60,000 tons daily despite an increase in labor supply. Since Jan. 1, he declared, the country showed a deficit of 350,000 tons of coal for industrial purposes and 260,000 tons for domestic needs.

Warning that government subsidies had been increased as much as the treasury could stand, the Premier called for modernization of equipment and general reorganization of the country's mines. Sixty-eight mining companies are reported to be operating more than 150 pits in Belgium.

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Mines Bureau Appoints Fuel Advisory Group

The appointment of a synthetic liquid fuels technical advisory group, composed of eleven outstanding chemists and engineers from industry, has been announced by Dr. R. R. Sayers, director of the Bureau of Mines.

"The cooperation and technical guidance of these men—all of whom are authorities on industrial petroleum and coal research—will be of invaluable assistance in attaining the objectives of the Bureau's five-year synthetic liquid fuels research and development program," Dr. Sayers said.

Members of the group are Eugene Ayres, staff chemist on process development, Gulf Research & Development Co., Pittsburgh; George Creelman, research engineer, Pittsburgh Consolidation Coal Co., Inc., Pittsburgh; Fred Denig, vice president and director of research, Koppers Co., Pittsburgh; H. W. Field, assistant manager, research and development department, Atlantic Refining Co., Philadelphia; H. O. Forrest, director of research, M. W. Kellogg Co., New York; Dr. Louis S. Kassel, research engineer, Universal Oil Products Co., Chicago; P. C. Keith, president, Hydrocarbons Research, Inc., New York; L. C. Kemp, Jr., director of research, Texas Co., New York; E. V. Murphree, vice president in charge of research and development, Standard Oil Development Co., New York; J. K. Roberts, director of research, Standard Oil Co. of Indiana, Chicago; and Dr. Harold J. Rose, vice president and director of research, Bituminous Coal Research, Inc., Pittsburgh.

Atomic Power Development Program Announced by Manhattan District

The Manhattan Engineer Project, headed by Major General L. R. Groves, announced April 12 that the task of harnessing atomic energy for generation of peacetime electricity will be undertaken by American industrial scientists on a technical foundation made by the Metallurgical Laboratory of the University of Chicago. "Monsanto Chemical Co.," he announced, "will have over-all authority and responsibility for design, construction and operation of an experimental atomic-energy power plant at Oak Ridge, Tenn. Other industrial organizations have been asked to participate in the development as consultants and to furnish technical men."

A meeting was held April 11 in New York City to formulate plans for organization and to secure the cooperation of the many diverse organizations necessary to develop atomic energy for power purposes. Representatives of the Manhattan Engineer District, the Army Air Forces, U. S. Navy, Monsanto Chemical Co., the Metallurgical Laboratory of the University of Chicago, Allis-Chalmers, General Electric and Westinghouse, industrial firms that helped develop the atomic bomb, attended the meeting. Definite steps were taken to organize in such a way as to secure the cooperation necessary to develop the proposed unit at the earliest possible date.

Scientists connected with the Manhattan Project, including the Metallurgical Laboratory, will assist throughout the work as well as specialists of the Army, the Army Air Forces and the Navy. General Groves said that the initial atomic-energy demonstration plant is to be based on fundamental research carried out largely at the Metallurgical Laboratory. He identified Dr. Farrington Daniels, project director of the Metallurgical Laboratory, as author of the basic concept which will make the plant possible.

Dr. Charles Allen Thomas, vice president and technical director of Monsanto, will be in charge of the project. Basically, his assignment is to guide and direct the complex job of applying nuclear theories and practice to commercial requirements.

General Groves said Monsanto accepted the assignment at the specific invitation of the Manhattan District. "Assignment of the work to private industry," he added, "is in keeping with the line of policy successfully pursued in the Manhattan District's work to date."

"The first atomic power plant," he added, "will involve the design, construction and operation of a chain reaction pile together with auxiliary equipment. Entirely absent will be the danger of violent explosion. Although the plant will produce some electricity, it probably will not be an economic unit for such production and is not so intended.

"Studies looking toward the first unit have progressed to the point where draftsmen are ready to translate technical data into engineering blueprints," General Groves reported. It is expected that actual construction will get under way this year. The initial expenditure for the experimental unit has been tentatively placed at $2,500,000.

General Groves explained that the project introduced technical and scientific problems of great magnitude. He emphasized that years may elapse before nuclear energy can be brought to within the competitive price range of conventional fuel.

"Primary consideration," he said, "is the need to reduce to practice some of the many ideas for power piles developed as an outgrowth of the atomic-bomb program and to supply evidence that might be of value in clarifying any international patent situation that might arise. Patent rights growing out of the work will be vested with the Government of the United States and Congress will determine the use to which they will be put.

"When the pile is ready to operate, possibly sometime late this year or early next year, radioactive fuel will be introduced into the pile structure under controlled conditions and a chain reaction will get under way. Mass will be converted into heat energy and finally the mechanical energy will be converted into electrical energy.

"In evaluating prospects held by the proposed experimental atomic-energy power plant," said General Groves, "it is important to remember that a great amount of work remains to be done before fissionable material can be brought within the range of economic usability. This is to be a pilot plant; in other words, a research tool from which knowledge will be derived for subsequent development and exploratory work. It must therefore be viewed in the light of a scientific and engineering experiment rather than an economically practical application of nuclear fission for generation of electricity.

"In broad and general terms, the new pile will employ scientific principles utilized in the Chicago pile, where the first chain reaction in history took place; the Clinton Laboratories pile, where the first experimental quantities of plutonium were made; and the full scale pile at Hanford, Wash.,

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LOWEST 50 H. P. LOADER MADE
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PERFECTLY!

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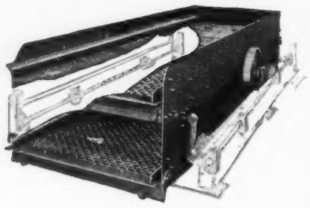
1. Results count! Yes, day after day performance records piled up by Seco screens over the last eight years on all types of coal mining installations prove conclusively their ability to screen more tons per hour. Here's How



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2. This basic, engineering advantage makes the difference! Seco and only Seco has a fully controlled true circular action—that never varies—keeps every inch of screen surface working on exactly the same plane at all times.

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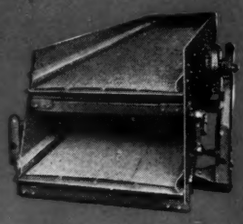
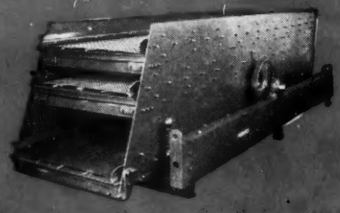


DOUBLE DECK



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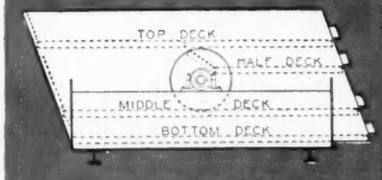

THREE AND ONE HALF DECK

To scalp a small amount of oversize and make 3 finished sizes as well as fines.

SECO

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where plutonium is produced. But the new installation is to fill an entirely new role," General Groves pointed out. "Unlike the others, which were made specifically to produce plutonium, the atomic power plant will have as its primary purpose the generation of heat energy and the conversion of that energy into peacetime electricity. The change of purpose introduces a host of new problems, some of which may await solution for years. It is not unlikely that new and radical engineering principles will be considered in the conversion of heat energy to mechanical and electrical energy."

Emphasis was placed on the fact that the new pile will not be accompanied by the hazards of what might be termed "an atomic explosion." Safety is provided by the very design and concept of the application. Where the atomic bombs were designed specifically for extremely rapid reaction and disintegration, the new pile is being designed specifically for the slow conversion of mass into energy in a fashion similar to the Hanford piles.

The power unit is to be known as the "Daniels Pile," honoring Dr. Daniels, the scientist chiefly responsible for its development. Dr. Daniels, on leave as Chemistry Professor at the University of Wisconsin, last year succeeded Dr. A. H. Compton, Nobel prize winner and now chancellor of Washington University, St. Louis, as project director of the Metallurgical Laboratory at Chicago.

Closely associated with Dr. Daniels in the new undertaking of research and development was Dr. John E. Willard, on leave of absence from the University of Wisconsin and now working at the Metallurgical Laboratory.

Dr. Thomas, the Monsanto vice president to whom the Manhattan District has entrusted over-all responsibility for the design, construction and operation of the unit, was one of the key men in the atomic-bomb program. He headed studies in the chemistry and final purification of plutonium and since July 1, 1945, when Monsanto succeeded the University of Chicago as operators, has been in general charge of Clinton Laboratories.

At Monsanto-Clinton Laboratories, the technical phases of the power project will be in charge of Dr. C. Rogers McCullough, and a laboratory staff, while the administrative phases will be in charge of Dr. M. D. Whitaker, laboratory director. Participating in the design and construction work will be both the scientific research group and the technical group at Monsanto-Clinton Laboratories.

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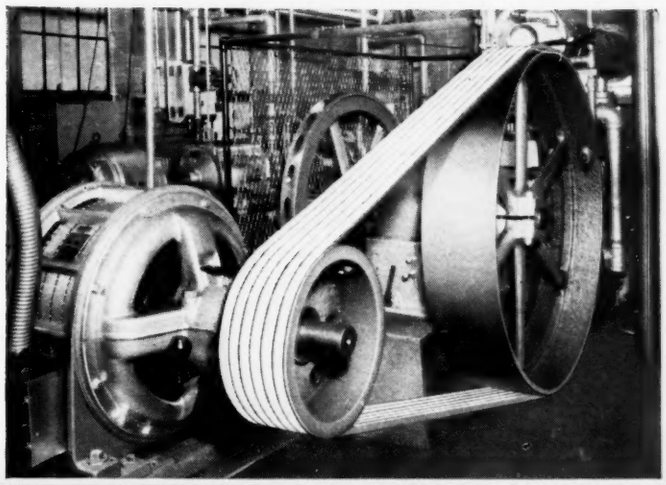
Railroads Ask Freight Rate Boosts

In a move to offset wage increases and rising costs, the railroads of the United States April 15 petitioned the Interstate Commerce Commission for a 25-percent increase in freight rates, with certain exceptions where lower increases are sought, to take effect May 15, pending hearings.

Rates asked, with certain exceptions, for anthracite coal vary from 15c. per net ton on present rates up to 75c. to a 40c. increase on present rates of over $1.50, with

it's worth knowing why this is true



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Every improvement developed by Gates for U. S. Combat Units—and many later improvements, also—have been added, day by day, to the quality of the Standard Gates Vulco Ropes which have been delivered to you.

That is why, even while the war was still in progress, you were getting in your Standard Gates Vulco Ropes a product built to far higher service standards than any V-belts ever built by anyone before the war.

And that is only half the story. Through continuing specialized research, the service qualities of these superior Gates Vulco Ropes have been still further improved as all of Gates facilities and energies have been returned to the service of industry.

These are the simple reasons why the standard Gates Vulco Ropes you are getting today are delivering far better service than any V-belts ever built before!

All Gates V-Belts are Built With *The Patented* **CONCAVE SIDE**

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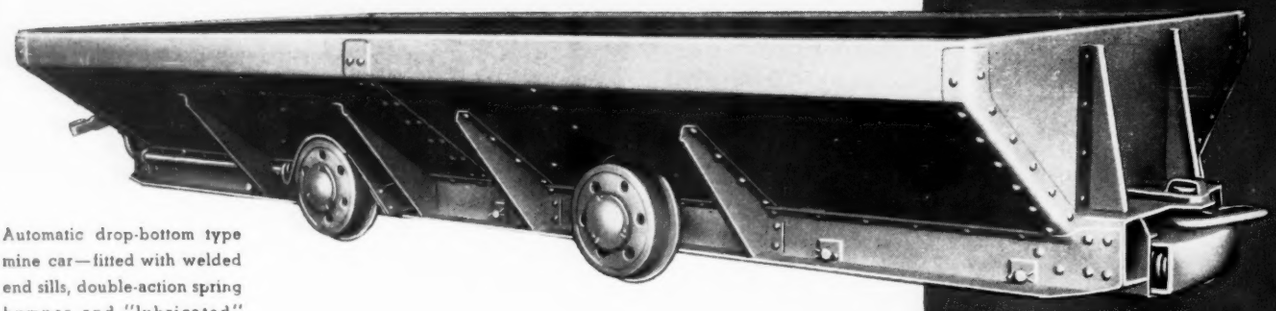
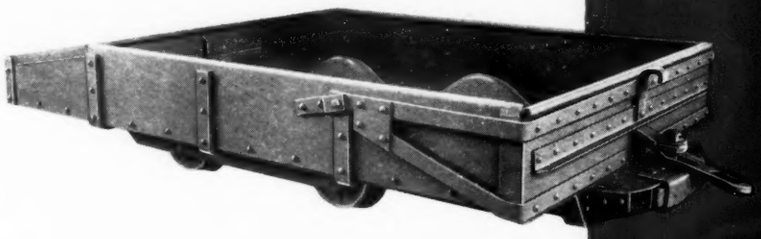
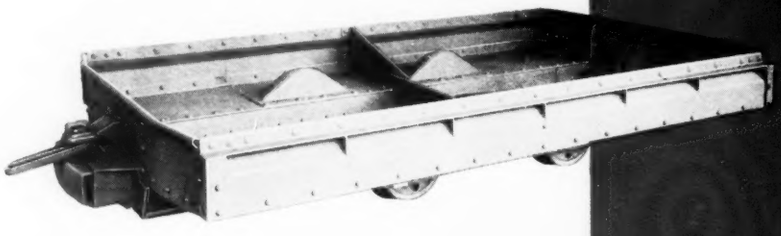


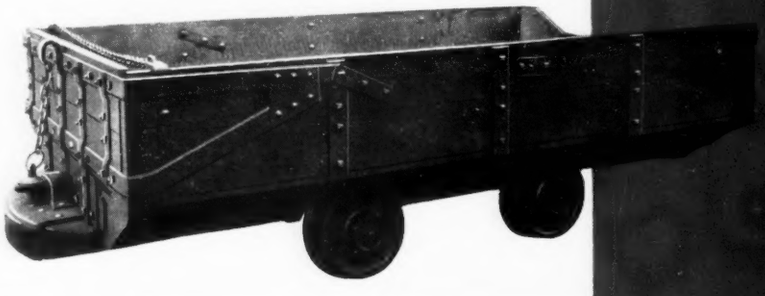
Automatic drop-bottom type mine car—fitted with welded end sills, double-action spring bumper and "lubricated" doors. Anti-friction bearings in the wheels.



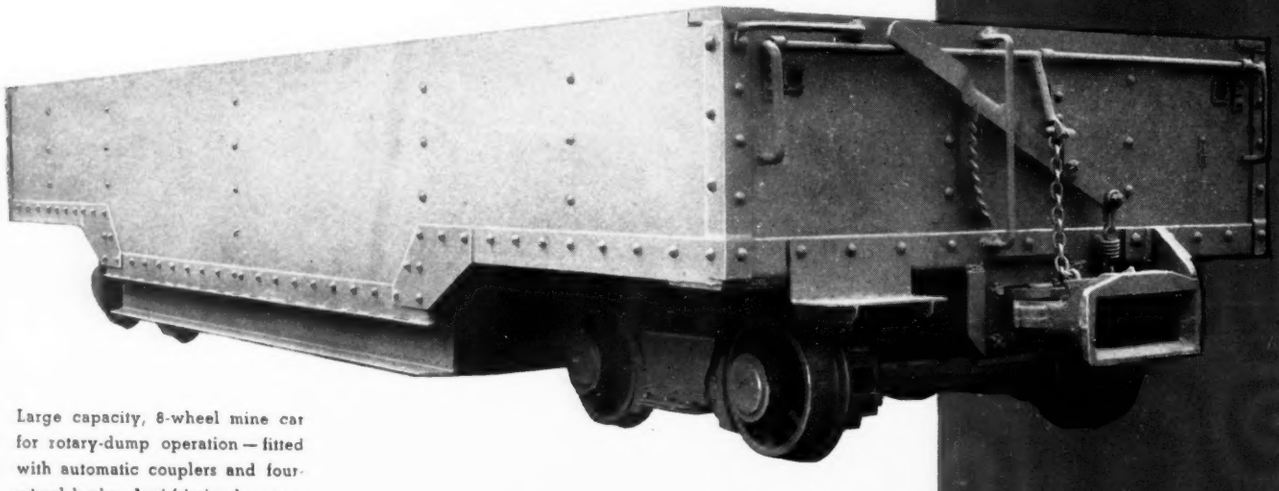
End-dump type, all-steel, four-axle mine car—fitted with welded end sills and double-action spring bumper. Anti-friction bearings in the wheels



Rotary-dump type, all-steel, four-axle mine car—fitted with welded end sills and double-action spring bumper. Anti-friction bearings in the wheels



End-dump type, composite, wood and steel, thru-axle mine car. Anti-friction bearings in the wheels.



Large capacity, 8-wheel mine car for rotary-dump operation—fitted with automatic couplers and four-wheel brake. Anti-friction bearings in the wheels.

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Today—more than ever—modern mining methods require an efficient transportation system. High-speed haulage with modern, "up-to-date" a.c.f. Mine Cars will step-up your production by increasing your loading efficiency—resulting in lower costs per ton of coal!

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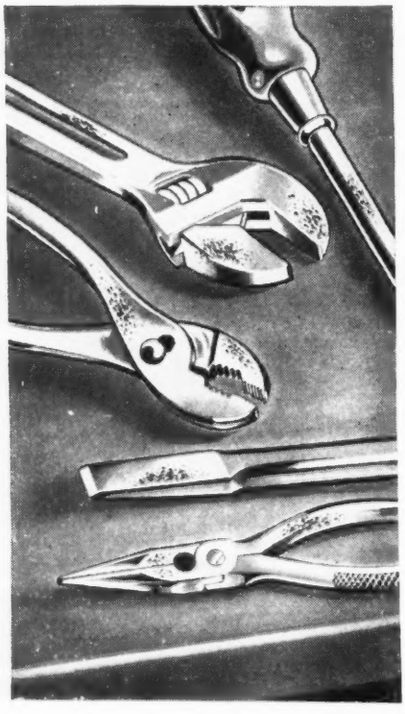
$100,000 Worth of Hand Tools saved from "RUST"

NEW PRODUCT DOES THE JOB AFTER PLANT CONDUCTS EXHAUSTIVE TESTS

"Some time ago, we were called in by a prominent manufacturer.* Corrosion of all metal parts in his entire plant had gone out of control. The machine shop and hand tools, valued in excess of $100,000, were a sorry looking "dusty-brown." Everything they had used in the way of rust preventives heretofore failed to solve their difficulty.

Lubrication Engineer's Report

After studying their problem we recommended our General Purpose Anti-Corrode No. 100 and suggested that they give it exhaustive tests. Their chemist did so and we are happy to report that it solved their problem.



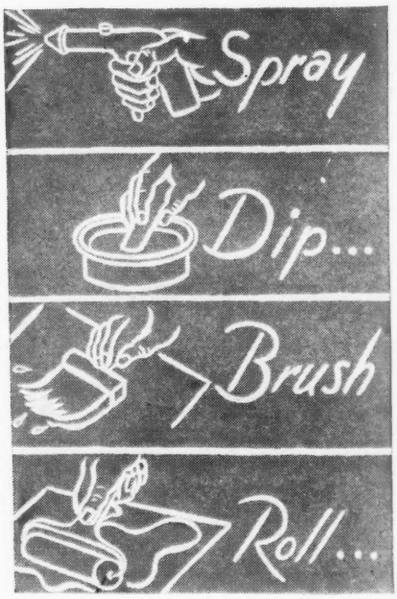
Used On Hand Tools As Well

They have since used over 150 gallons of this Anti-Corrode on everything metal in their plant, including small hand tools such as pliers and screw drivers."

Anti-Corrode No. 100 is one of several new types of Cities Service protective coatings for metals. Designed to prevent corrosion of raw stocks, finished parts and completed machines, it adheres firmly, displaces moisture and protects longer than similar materials now on the market.

Easy To Apply

Apply Anti-Corrode by ordinary work-shop methods. Spray, dip, brush or roll it on. The protective film is continuous and non-porous—does not break at sharp edges nor rupture on flat surfaces. It need not be removed from metal to be stamped, drawn or otherwise formed.



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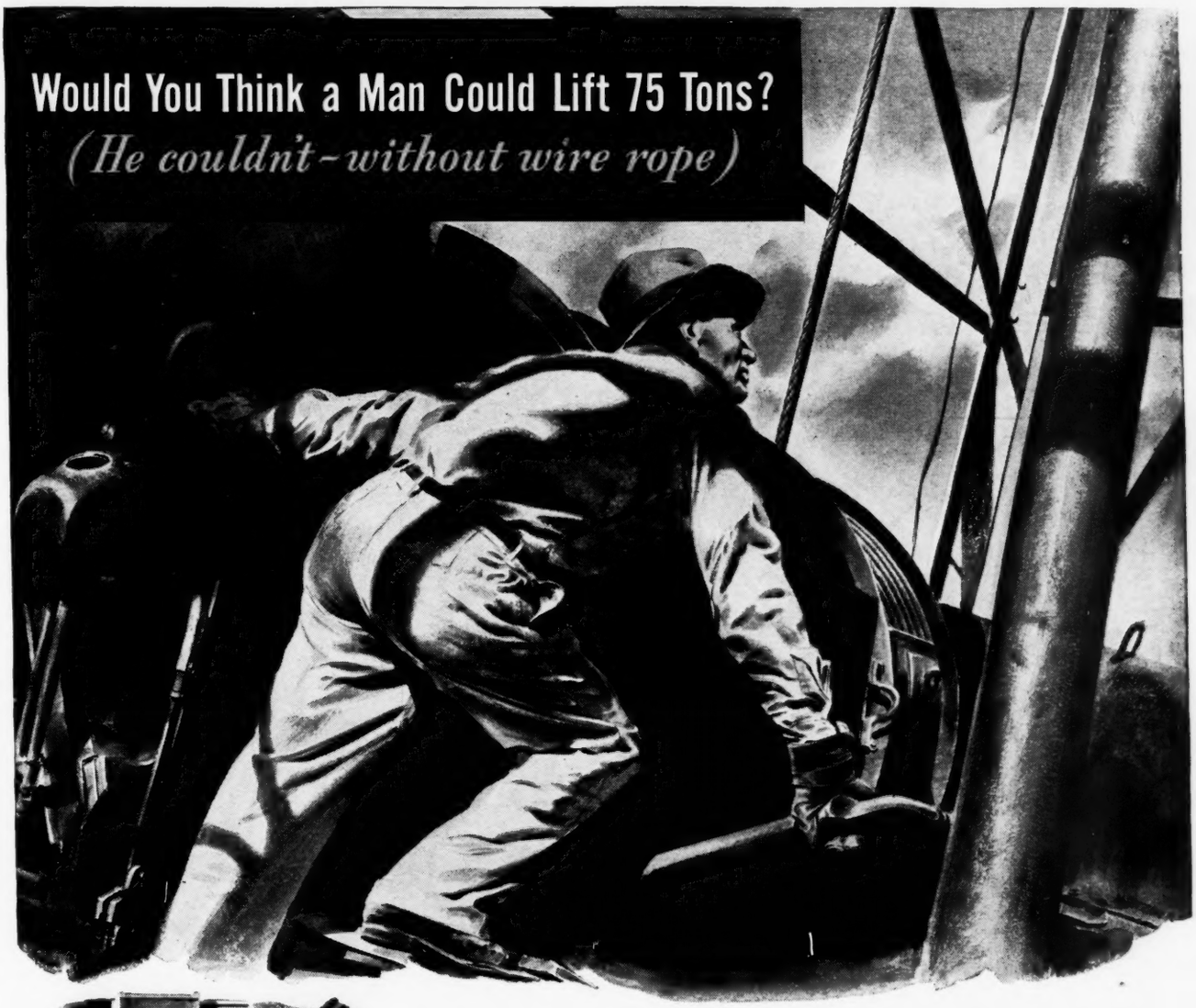
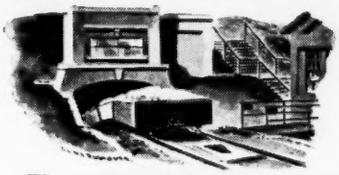
(He couldn't - without wire rope)



He's lifting 15,000 feet of heavy steel drill pipe—no wonder he keeps his eye on the wire rope. Running at high speeds, wire rope tends to whip and pile up on the drum. This crushes rope and forces early shutdowns for replacement. Operators prefer Preformed wire rope because it resists whipping, spools evenly and reduces shutdown frequencies.



They use a lot of wire rope in and around coal mines. One important ground use is for car spotters and retarders. Preformed wire rope is easier and safer to handle.

Power shovels scoop up earth and rock with giant bites. The wire rope makes it look easy. Being more flexible, Preformed wire rope runs over small sheaves with minimum wear.

Modern machines almost invariably are equipped with Preformed wire rope. Preformed is flexible and limber. It is tractable and free from internal tension. It handles easier, so operators like to work with it, and it lasts longer so the front office likes to order it.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

WIRE ROPE HANDLES EASIER - LASTS LONGER

Both are strong . . . but ONE is stronger!

TWO ELEPHANTS—both pachyderms of power—but only one has the extra staying power, the *plus stamina* it takes to win the mighty fight-to-the-finish.

TRUE—*all wire ropes* have stamina . . . but we believe that Rochester wire ropes show *plus stamina* on the job . . . because plus stamina is built in at the Rochester Ropes plant.

FOUR M's enter into the fabrication of plus utility Rochester wire rope: (1) MEN who take special pride in skilled, careful craftsmanship . . . (2) MATERIALS chosen for plus qualities of toughness, flexibility, safety . . . (3) MACHINERY that is strictly up-to-date in its design for the manufacture of flawless wire rope . . . (4) METHODS of production proved unexcelled by the test of experience. Now all types, sizes, grades and constructions of plus utility Rochester wire rope . . . preformed or standard . . . are available for immediate shipment.

LOCKED-IN LUBRICATION is forced by air pressure between individual wires. This process requires twice as much lubricant as is absorbed by other methods . . . protects against internal friction caused by rope passing over sheaves . . . assures longer life and better service from wire ropes made by Rochester.

ROCHESTER *Ropes*
CULPEPER, VIRGINIA

Rochester Ropes' engineers can advise you on your special problems of wire rope selection, use and maintenance. Inquiries invited.

a 5c. raise on raw anthracite carried to breakers. On bituminous coal an increase of 15c. per ton, with certain exceptions, is requested. Increases on coke shipments are to be similar to those on anthracite.

Increases proposed on other mining products, for example, include: 6c. per 100 lb. on petroleum and its products in tank cars; 25 percent on crude petroleum when not taking petroleum rates; 80c. per ton on iron and steel; 12c. per ton on iron ore; 20c. per ton on sand, gravel, crushed stone and slag; 20c. per ton on sulphur; 20c. per ton on bituminous asphalt rock, asphaltic limestone, and asphalt-coated rock.

•

Oil-Heating Sales To Top Billion

Industry surveys indicate that the American homeowners are going to "buy more than a billion dollars' worth of oil-heating equipment in the next five years," W. A. Matheson, president, the Oil-Heat Institute, told more than 3,000 delegates attending the opening of the National Oil-Heat Exposition in Philadelphia, April 23.

A. E. Hess, managing director of the institute, told the delegates that the industry "promises to be one of the first major industries to complete reconversion and to be launched in full scale production. An average of 500,000 new oil burner sales in each of the first five post-war years is indicated by several different surveys," he said. "These are power-driven units and to them may be added an average of 750,000 a year based on vaporizing units as used in space heaters, floor furnaces and water heaters. Because of shortages in manpower, materials and components, manufacturing at the start of 1946 cannot meet the demands placed upon it. The situation will begin to ease, it is expected, within a few months," he added.

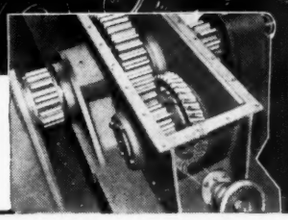
•

Dunbar Honored On Retirement

Frank B. Dunbar, retiring general manager of Mather Collieries, Mather, Pa., was honored by more than 200 persons at a testimonial dinner arranged by his business associates April 14. Mr. Dunbar has served the bituminous industry for more than 60 years in Illinois, Kentucky and Pennsylvania and since 1929 has been in charge at Mather Collieries, a captive division of Pickands, Mather & Co. He is a past president of the Coal Mining Institute of America.

Mr. Dunbar's distinguished record as a coal mining executive was praised by Governor Edward Martin, of Pennsylvania, whose letter was read at the dinner, and by many of the guests attending the occasion. No fires or explosions occurred in mines under his supervision during his long career and he instituted many modern safety practices for improvement of the industry's safety record, testimonial speakers declared.

Addressing his hosts and friends at the end of the dinner, the retiring manager stated that he intends to make his home in Greene County, Pennsylvania, and to spend



We "wormed" out the answer to crowd troubles

Crowding action on electric shovels needn't be slow — merely because the machine is big.

P&H has made it swift and responsive with a worm crowd that is the most rugged, compact unit ever to be used on an electric shovel.

Shafts are shorter, therefore much stronger. Overhung gearing is entirely eliminated, resulting in better alignment and longer life . . . quieter and smoother operation.

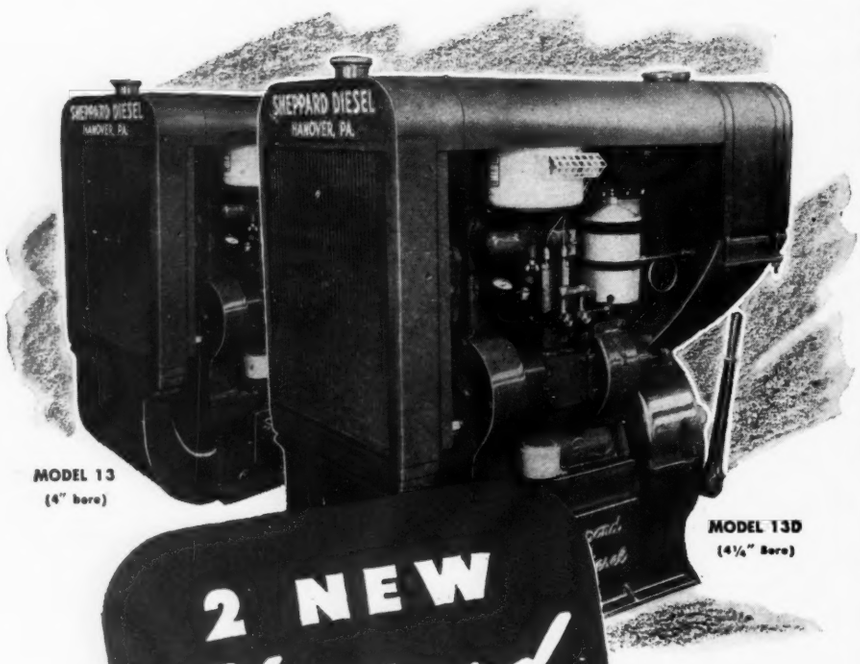
And because of the worm drive, inertia is cut to the minimum. Its faster response and greater mechanical efficiency are the result of a special cone-type worm, running in oil.

Furthermore, the entire gear case and shipper shaft journals are welded integral with the boom, providing permanent alignment and adding greatly to boom strength and rigidity.

Easier, faster crowding with longer life is another way that P&H's progressive design is helping to increase production and cut tonnage costs on all kinds of large scale digging. The facts are yours for the asking.

P&H ELECTRIC SHOVELS
4540 W. National Ave.
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION
EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · HOISTS · WELDING ELECTRODES · MOTORS

LEADING THE WAY IN ELECTRIC SHOVEL DEVELOPMENTS



2 NEW Sheppard DIESELS

Develop 16 and 18 Continuous H.P. at 1200 R.P.M. —Fully Equipped

THE new model 13 series combine the compactness of the Sheppard Model 7, 8 H.P. engines with the high power output per cubic foot of the Model 6, 25 H.P. units.

Included in their design are all the advanced engineering features found on every Sheppard Diesel.

Removable, wet-type cylinder liners . . . oil-spray-cooled pistons . . . full pressure lubrication . . . full floating piston pins . . . are just a few. The exclusive Sheppard fuel injection system insures easy, sure-fire starting because it was developed with the Sheppard engine—not adapted to it.

The 2 cylinder Model 13 engines . . . like all other Sheppard Diesels . . . are of the full Diesel, solid fuel injection type with compression ignition. No special starting devices . . . no electrical ignition . . . no carburetor to maintain and service. 24 volt electric starting motor, power take-off and clutch are standard equipment on both engines.

The Model 13 Sheppard Diesels are ideal for driving portable or stationary pumps, compressors and saw mills. Their compact design facilitates handling and assures maximum H.P. output per cubic foot of installation space.

SEND FOR SPECIFICATION SHEET

Mail a postcard today for catalog sheet giving full specifications, dimensional drawings and power curves.

R. H. SHEPPARD COMPANY, INC., 11 MIDDLE ST., HANOVER, PA.

DIESEL'S THE POWER . . .

Sheppards' the Diesel

Power Units, 3¾ to 56 H.P. • Generating Sets, 2,000 to 36,000 Watts

EQUIPMENT APPROVALS

Three approvals of permissable equipment were issued by the U. S. Bureau of Mines in March, as follows:

Joy Mfg. Co.—Type 32D14P shuttle car, storage-battery operated; three 5-hp. motors; 90 volts, d.c.; Approval 550; March 5.

Atlas Car & Mfg. Co.—Atlas Type 157-195, 10-ton storage-battery locomotive; Approval 1538; March 6.

Joy Mfg. Co.—Type 2SL-2E shelf loader; five motors, including two 10-hp., two 7½-hp., and one 4-hp.; 250 volts, d.c.; Approval 551; March 22.

the rest of his years golfing and fishing.

Alan Brooks has succeeded Mr. Dunbar as general manager of Mather Collieries.

Among the distinguished guests attending the testimonial dinner were George Stribling, Cleveland, Ohio, representing Pickands, Mather & Co.; Byron Canon, secretary, Western Pennsylvania Coal Operators' Association; Maurice Cooper, toastmaster; Richard Maize, Pennsylvania Secretary for Mines; George Deike Mine Safety Appliances Co.; Willis Drake, *Coal Age*; T. A. Day, Bituminous Coal Research Inc.; William Hines, United Mine Workers of America; Judge Hooker, of the Greene County Court; and Walter Montgomery, attorney of Greene County.

•

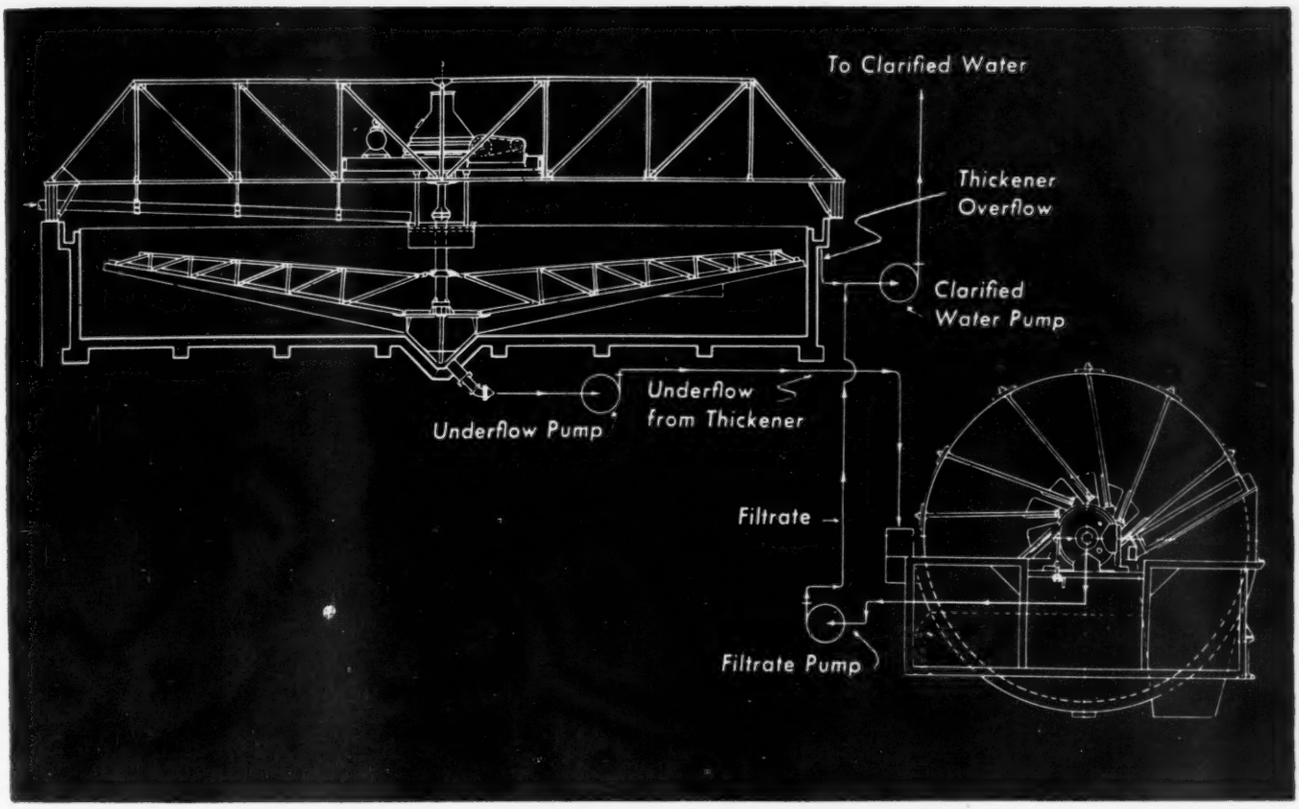
American Methods To Up British Output

"If Great Britain continues adoption of the American system of room-and-pillar mechanized mining in its coal industry, the tons-per-man-shift production rate may be lifted to equal that of modern U. S. bituminous mines with comparable conditions," stated H. R. Wheeler, vice president in charge of export sales of the Joy Mfg. Co., Pittsburgh, in a talk before the Engineers' Society of Western Pennsylvania at the William Penn Hotel, Pittsburgh, April 15.

Mr. Wheeler spent 3½ years in Europe during and after the war studying European mining methods and advising coal producers on means of increasing production by the adoption of American mechanical-mining methods. Most of this time was spent in Britain, where he visited 72 different mines.

Mr. Wheeler pointed out that during the war British mines were producing 2 tons of coal per man-shift in seams similar to those in which American miners and equipment were producing 15 to 18 tons. He attributed this low production rate in Britain to long-wall mining and to lack of haulage and materials-handling equipment.

When Mr. Wheeler left England after the war, 125 mines were preparing to adopt American mechanized room-and-pillar mining methods and 60 were already operating



An Efficient Team

For a FINE COAL DEWATERING PLANT

The system illustrated, or one providing for further concentration, will soon have to be a part of every modern coal washing plant.

As designers and builders of thickeners, hydroseparators and vacuum filters—important elements of a fine coal dewatering plant—General American can recommend the equipment best suited to the particular problem involved—for some, the elimination of stream pollution; for others, the recovery of marketable coal.

The Thickener and the Filter both have distinctive features of design and construction. The new General American Conkey tangential disc vacuum filter has a higher capacity than any other rotary disc vacuum filter.

The General American Thickener or Hydroseparator is the most completely automatic and foolproof thickener now available. The hydraulic lift makes a virtually "choke proof" machine, permitting shut-downs without recirculation and starting under full load. The thickener will never stall in the event of power failure. Where operation is such that surges of fine coal occur, the thickener will handle them automatically. It also provides the highest underflow density without danger of stalling or choking the machine, thus raising the efficiency of the filter operation.

Because both units are designed, precision built and placed in operation by one organization—under one contract and one responsibility—a more efficient installation is assured.

Let a General American resident engineer in the coal field assist you in designing new units or modernizing your existing equipment.

General American
TRANSPORTATION CORPORATION
process equipment • steel and alloy plate fabrication

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OFFICES: Chicago, Louisville, Cleveland, Sharon, Orlando, St. Louis, Salt Lake City, Pittsburgh, Washington, D. C.

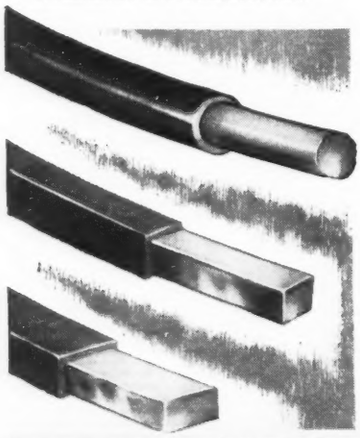
WHERE *motor overwork* IS THE RULE . . .

cut the risk of another burnout . . .

rewire with *Deltabeston magnet wire**

When you have to rewind a motor—*make the most of it.* Rewind it, or specify that it be rewound with Deltabeston magnet wire—the outstanding Class B asbestos-insulated magnet wire. You'll be sure of extra service life in spite of the heat that comes with overwork.

Burnouts that interrupt production cost big money. Rewinding costs are high, too, as compared with the small extra investment you make in rewinding with this life-lengthening magnet wire. What's more, your rewound motor won't have to be pampered. It can go back in a "key" spot where service conditions are extra severe.



Deltabeston magnet wire is made in shapes and sizes interchangeable with regular double-cotton insulated wire. Its soft copper conductor and flexible covering permit winding of intricate shapes without difficulty. Its pure felted asbestos, impregnated with a heat-resisting bonding agent, makes light of temperatures up to 200 C.

For more facts on Deltabeston and its application, write Section Y-561-10, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn. All Deltabeston asbestos, glass and synthetic wires are distributed nationally by G-E Merchandise Distributors.

*Trade-mark Reg. U.S. Pat. Off.

GENERAL ELECTRIC

under the system. Contrary to popular belief, Mr. Wheeler said, not all mines are thin-seam operations in Britain. Many seams in the Isles are 4 to 6 ft. thick.

Mr. Wheeler praised the record of French coal operators and miners and reported that they have already attained their prewar production level despite use of badly worn machinery. France, however, still provides only 60 percent of the coal it requires, depending for its remaining needs on imports from Britain and European countries. Since France has now nationalized about half of her mines, observers in this country will have an opportunity to compare the production of private and government-operated mines within the same country.

•

Additional Offer Made for "Big Inch"

An offer of $40,000,000 for the Big Inch pipeline and an application to convert it to the transportation of natural gas from Texas to New York, made by the Big Inch Gas, Inc., was revealed April 3 by the Federal Power Commission. The company was reported to have also offered to purchase the Little Inch line for continued transportation of petroleum products.

According to the application, conversion of Big Inch would cost $30,000,000, and the line would have a daily capacity of 275,000,000 cu.ft., to be sold at a price not exceeding 24c. per 1,000 cubic foot. The company states that it already has developed a market for 90 percent of this capacity with unnamed utility companies in the New York and New Jersey area, and that it has commitments for the purchase of 300,000,000 cu.ft. daily.

Application was made some time ago by the Transcontinental Gas Pipe Line Co., Inc., Longview, Tex., for the conversion of both Big and Little Inch lines for the transportation of natural gas.

Extensive additions to its gas-transmission lines running from Texas to Michigan to be made in 1946 and 1947 have been proposed by the Panhandle Eastern Pipe Line Co. in an application to the Federal Power Commission. The program will cost an estimated $27,313,000 and will result in delivery of an additional 90,000,000 cu.ft. of gas daily, according to the company.

•

Renew Holmes Awards After Five Years

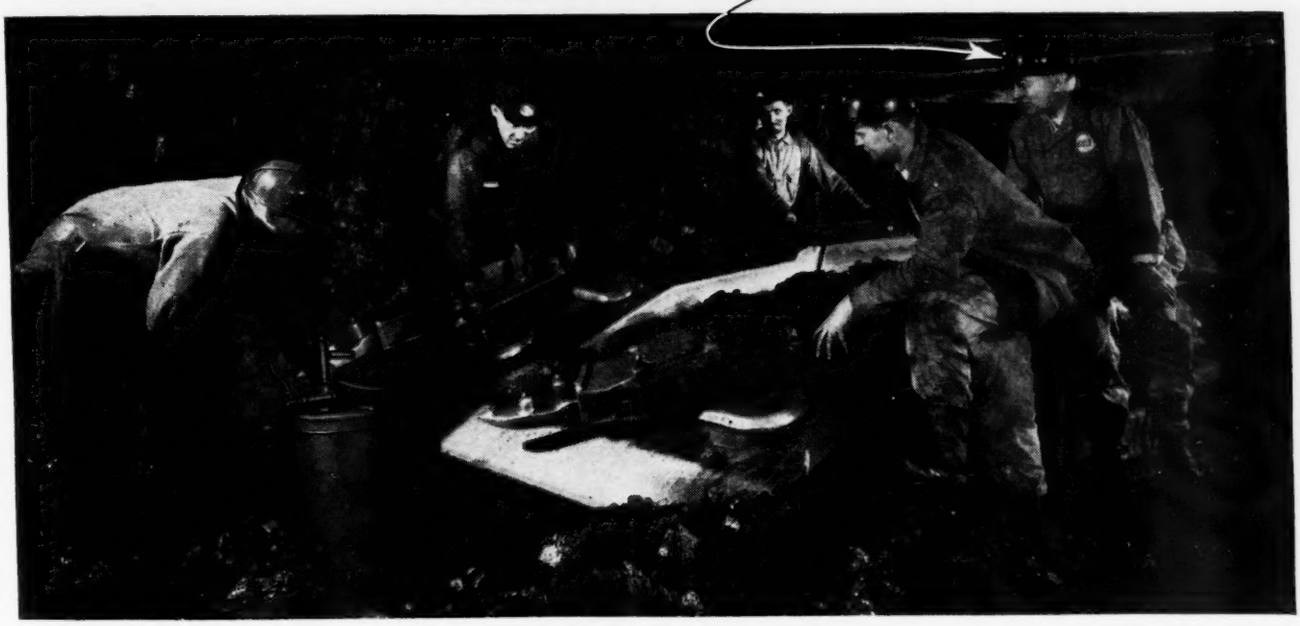
Resumption of Joseph A. Holmes Safety Association operations, recessed since 1941, and the award of medals and diplomas to 35 workers in mining and allied industries for risking their lives to save others and for displaying courage and resourcefulness in emergencies during this five-year period, recently was announced by Dr. R. R. Sayers, director of the U. S. Bureau of Mines and president of the association. Medals and diplomas were awarded to 19 workers and diplomas to 16. In addition, certificates of honor were awarded to 162 mining and

(Continued on page 178)

Greater tonnage between overhauls

— —lower maintenance costs

when the Gulf Lubrication Service Engineer is "in the picture"



Actual photo of a Master Mechanic (second from right) consulting with a Gulf Service Engineer on loading machine lubrication. This Gulf lubricated machine recently loaded over one-half million tons of coal plus a large tonnage of refuse between overhauls—needed no repairs for over two years.

One answer to the problem of getting maximum tonnage from your loaders is to make sure that a minimum of operating time is lost through excessive wear and failure of vital parts.

Here a Gulf Lubrication Service Engineer can give you effective help. He knows how to keep loading machines and other mine equipment up to capacity production by the proper application of the right lubricants.

You get many other benefits, too, when the Gulf Lubrication Service Engineer is "in the picture" in your mine. He can help you cut maintenance and power costs, improve safety, and lengthen the life of your equipment.

Call in a Gulf Lubrication Service Engineer today and let his knowledge and experience work for you on your maintenance problems. His helpful counsel—and Gulf's complete line of more than 400 quality oils and greases—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write, wire, or phone your nearest Gulf office.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation • Gulf Refining Company

Division Sales Offices:

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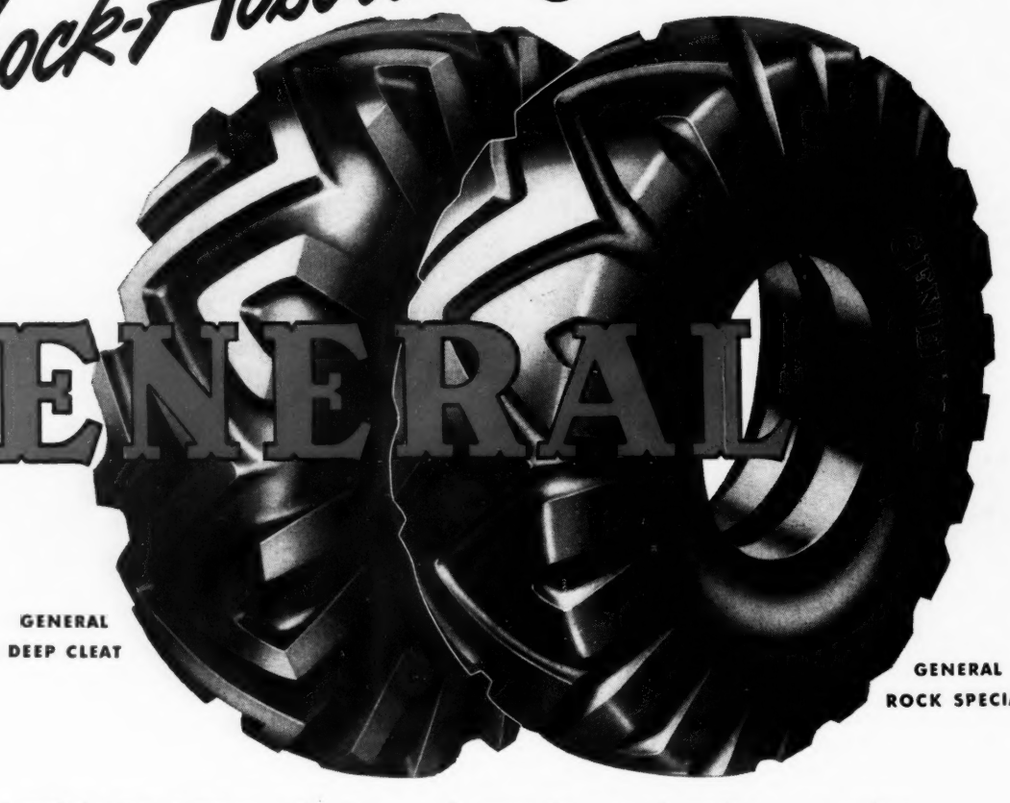
NEW TIRE CONSTRUCTION ABSORBS SERVICE DAMAGE —REDUCES OPERATING COSTS

the *Shock-Absorber Constructed* GENERAL



GENERAL DEEP CLEAT

GENERAL ROCK SPECIAL

● General Off-the-Road Tires take "in stride" the service abuses that commonly cause tire failures. Their exclusive construction *absorbs* and uniformly distributes heaviest shock loads and stresses throughout the tire carcass . . . thereby neutralizing concentrations of impact that frequently cause bruising . . . tearing . . . snagging . . . blow-outs.

Built with General's famous Top Quality, the exclusive shock-absorbing design of General Off-the-Road Tires produces a new standard of long tire service and economy for heavy contractors.

THE GENERAL TIRE & RUBBER CO. • AKRON, OHIO

The GENERAL TIRE — OFF-THE-ROAD TIRES

HOUSING CAN COST TOO MUCH

EVERYONE in the United States wants our people, and particularly our war veterans, well housed quickly. Almost everyone, we believe, likes the vigor and imagination with which Wilson W. Wyatt, the housing expediter, is going about the job of mobilizing our housing resources.

No one, however, wants the veterans, or anyone else, to get a lot of severe economic headaches along with the housing. As it stands, the emergency housing program runs unnecessary risks of having such results.

Here are the reasons:

1. The principal opportunity the program offers to the veteran is that of buying a high-cost house where a chance to rent would, more often than not, meet his needs much better.

2. At the worst possible time, the program adds substantially to the dangers of a runaway inflation of the sort that inevitably ends in a crash.

3. Little is done to try to reduce the arbitrarily high costs of building, such as those resulting from restrictions imposed by labor unions and antiquated building codes.

4. By giving overriding priorities to unattainable goals of home construction, the program endangers a volume of industrial construction necessary to sustain full employment.

Needs of Veterans

First on the needs of the veterans. What many, if not most, veterans need is a chance to rent a place at a reasonable rental while they are getting shaken down in their postwar careers which in many cases are inevitably unsettled at this time. Essentially, what the "Veterans Emergency Housing Program" gives them is a chance to buy, for about $6,000, a house built along conventional lines and padded with much unnecessary labor and material cost.

But what are the alternatives? There are at least two. One is to put far more emphasis on more effective use of existing housing than the Wyatt program has thus far. The other is to see that the proportion of new rental units is much stepped up.

Incredible as it may seem, there are at present more than 2,000,000 vacant dwellings in the United States. Many of them should be demolished. But many permit of relatively satisfactory temporary use. Many more single dwellings can readily be converted into comfortable multiple dwellings. The emergency program assumes that only 350,000 dwelling units can be provided this year by these expedients, but it does not seem unreasonable to assume that this figure might be doubled by a vigorous drive. The result would be a better balanced emergency housing program, because it would provide more rental housing immediately and save critical building materials.

Of the new housing units contemplated by the Wyatt program, it is estimated that only about 20 per cent will be for rent. Before the war more than half of the homes in the United States were rented. That means that unless the Wyatt program is to create little less than a revolution in the terms on which homes are occupied, it must be revised to include a much higher proportion of rental units.

To secure the result in the face of present high building costs special inducements will be required. They might be provided by allowing accelerated tax amortization of, say, half the construction cost over the next five years, together with rent ceilings high enough to make this form of investment attractive. This would, of course, call for higher rents, but the actual price to the veteran, in woe as well as money, might well be much less in the long run than if he bought an over-priced house now.

Too Easy To Pay Too Much

One of the mysteries of the Wyatt program is its general emphasis on measures to increase the supply of money with which to buy houses when the demand for houses is already at an all-time high. Some veterans may need special financial help, but the plan to give 90-95 per cent mortgages generally on new homes is not only unnecessary but positively dangerous. By providing up to $3.5 billions of government-guaranteed credit for homes this year, and almost twice as much in 1947, the program will release an equivalent amount of individual savings to create further demand for goods and services. All that such generous mortgage terms will accomplish with certainty is a dangerous lengthening of the odds that we will not avoid a boom and bust cycle of inflation.

If building codes were brought up to date and arbitrary union working restrictions were eliminated, the way would be paved for reductions in the price of standard houses which, it has been estimated, might run as much as 20 per cent. This would both give the buyer of a new house a far better run for his money, and also reduce the inflationary pressure created by the super-generous credit arrangements involved.

Getting anything done along this line is difficult, particularly because the restrictions are imposed by tens of thousands of separate localities and organizations. Some headway is being made. The local emergency housing committees being set up under the Wyatt program provide a means of doing much more. Far more steam must be put behind this aspect of the program, however, if its greatest potentiality for permanently constructive accomplishment is to be realized.

Crippling Essential Industrial Production

The goals set for emergency housing construction —1,200,000 new homes started this year and 1,500,000 started in 1947—are higher than any qualified authority thinks can be met without crippling other essential construction. The reasons commonly assigned for such optimistic goals is that they are inspiring to those in the industry and soothing to those who want something tremendous done about housing.

Under normal circumstances, relatively little damage might be done by such excessive goals which are a common feature of most Washington programs trying to elbow their way to the center of the national stage. However, the emergency housing program carries with it top priorities for the materials to be used. Consequently, other essential construction will have to get along on whatever share of critical building materials will be left after all demands of home builders have been satisfied.

The Civilian Production Administration estimates that output of important materials will fall far short of needs. It forecasts a 15 per cent deficit in lumber, 18 per cent in bricks, and 52 per cent in cast iron radiators. Hence, unless building materials output can be stepped up far more rapidly than now seems possible, a prohibitive squeeze will be put on industrial building to provide the materials needed for the Wyatt program. This would complicate unbearably the problems of sustaining full employment and getting the flow of production so important in avoiding the boom and bust route.

Perspective on the Housing Shortage

What is needed is an aggressive drive to get full production of building materials as rapidly as possible. Such a drive should concentrate on measures aimed at helping the industry remove the obstacles to all-out production rather than on such measures as the subsidy plan which seems quite likely to succeed only in enmeshing the industry in more government controls. After making due allowance for the materials outlook and the needs for essential non-housing construction, housing goals should then be set as high as feasible. As matters stand, by setting construction goals before feasible material goals are determined, the cart is put before the horse.

There can be no doubt about the acuteness of the housing shortage and the necessity of a program commensurate with the magnitude of the problem. It also remains true, however, that the housing shortage for the nation as a whole is not quite as desperate as those who want the country to drop everything and go to building houses would have us believe.

During the war 3½ to 4 million new dwelling units were built or created by remodelling in other than farm areas. The number of families living in such areas increased by less than 3½ million. Even though some of this housing was located in remote places as an adjunct of war production works, the wartime increase permitted a margin for more housing per family at this time. Indeed, it has been estimated that the rate of doubling up is only about one-third as great as in 1940. The margin did not begin to suffice, however, to meet the needs of those millions of people particularly in the lower income groups who, thanks to rapid increases in income, can afford to have and insist upon having better housing than they have ever had before.

A rising standard of income which makes possible a new standard of housing for many people is a fine thing. Above all, it is important to see the veterans get the best possible break in housing.

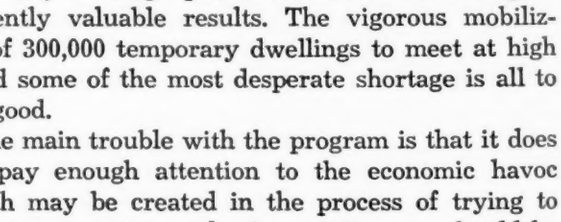
But Housing Can Cost Too Much

The Wyatt program has many good features. The emphasis on prefabrication, though perhaps overoptimistic, is hopefully modern. The emphasis on local collaboration in solving housing problems which are inevitably in large part local should lead to permanently valuable results. The vigorous mobilizing of 300,000 temporary dwellings to meet at high speed some of the most desperate shortage is all to the good.

The main trouble with the program is that it does not pay enough attention to the economic havoc which may be created in the process of trying to meet its excessive goals. As a nation, we should be and are willing to pay a high price to get adequate housing. But the price will be too high if we:

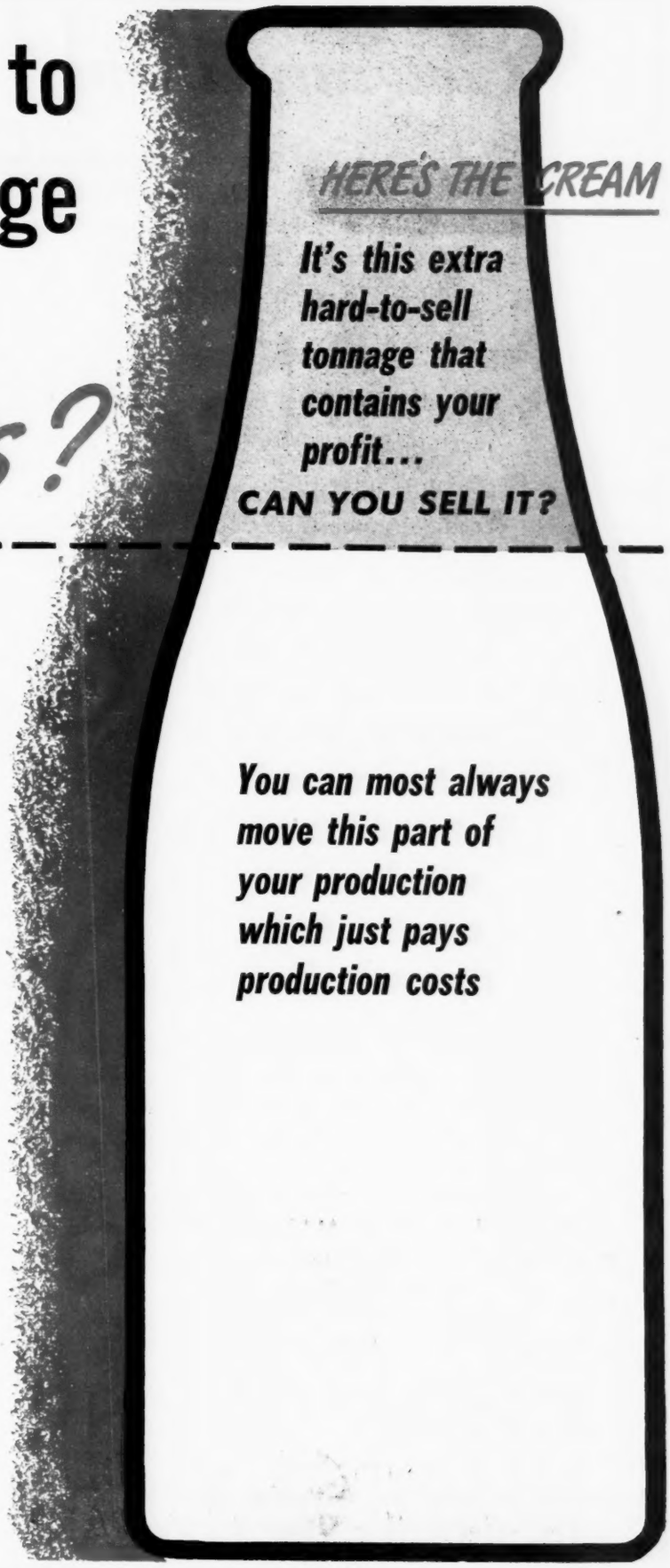
1. Give the veteran a bad bargain by selling him an over-priced house.
2. Cripple industrial production needed to create good jobs for veterans, and
3. Touch off a disastrous inflationary sequence in the process.

These pitfalls can be avoided. All of us, including the veterans, have a common interest in seeing that they are avoided.



President, McGraw-Hill Publishing Co., Inc.

Who is going to sell the tonnage that creates *the profits?*


HERE'S THE CREAM
It's this extra hard-to-sell tonnage that contains your profit...
CAN YOU SELL IT?
You can most always move this part of your production which just pays production costs

It may be easy enough to sell the basic tonnage you need to pay expenses, but extra "know how" is required to move, *at your price*, that additional tonnage and the hard-to-sell sizes which keep the mine in operation and profits up.

One ton of coal looks very much like another, unless it is a part of this extra tonnage . . . THEN it's an especially profitable ton *if you can sell it.*

It's the ability to sell enough tonnage of the right sizes to guarantee maximum running time, which ordinarily spells the difference between breaking even and earning a legitimate profit. *Maximum running time puts the cream on the top of your bottle.*

A good sales company can sell your "profit margin" coal. It is good business to make sure that there will be cream on the top of your bottle by making a permanent sales connection . . . NOW.

AMERICAN COAL Sales ASSOCIATION . . . Washington, D.C.

Congratulations

The Provident is proud of these prominent patrons—all of whom received the "COAL-FOR-VICTORY" Awards offered by publishers of Coal Age and the Solid Fuels Administration in 1944 and 1945—

Stith Coal Co.
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Pursglove Coal Mining Co.
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The Weyanoke Coal & Coke Co.

For more than half a century the Provident has been privileged to cooperate with leading coal mining companies in the development of group insurance plans designed to fit the special needs of the industry.

Today, thousands of workers employed by hundreds of mines know the HUMAN SECURITY provided by this low-cost protection against the financial hazards of accident, sickness and death.

Details on request.

PROVIDENT LIFE AND ACCIDENT INSURANCE COMPANY

Since 1887

CHATTANOOGA 2, TENNESSEE

petroleum companies for operating over long periods with few or no accidents and to 64 individual workers and supervisors for excellent long-time safety records.

Founded in 1916, the Joseph A. Holmes Safety Association is made up of 29 leading national organizations representing mining, metallurgical, and allied industries. It commemorates the efforts of Dr. Joseph Austin Holmes, first director of the Bureau of Mines, to reduce accidents and ill health in these industries and its chief activity is the annual awarding of medals and certificates for heroic conduct and good accident records.

Preceding the Association meeting Tuesday morning, April 16, in the office of Dr. Sayers in Washington, the board of directors met to review the activities of the past five years, hear reports from officers, and announce the resumption of annual awards. Attending were President Sayers; A. D. Lewis, the American Federation of Labor; Dr. J. J. Rutledge, chief mine engineer of the State of Maryland Board of Natural Resources; Carl Scholz, consulting engineer and representative of the American Institute of Mining and Metallurgical Engineers; Harry Gandy Jr., executive representative of the National Coal Association; Dr. A. C. Fieldner, chief of the Fuels and Explosives Branch, Bureau of Mines; and Dan Harrington, chief of the Health and Safety Branch, Bureau of Mines.

The Association also voted a special award, consisting of a certificate of merit and a bronze medal, to Dr. George S. Rice, for 25 years chief engineer in charge of the health and safety work of the Bureau of Mines, and one of the nations outstanding authorities on mine safety. Dr. Rice joined the Bureau of Mines when it was organized in 1910 and served with the Bureau continuously until his retirement about nine years ago.

Many acts of heroism, both underground and in surface plants, were revealed in the announcement of the awards to the 35 individual workers. Among the coal-mining medalists who risked their own lives to save others were two sets of brothers. One was a 17-year-old boy, Alfred Vickery, of Bates, Ark., who went down into an 81-ft. shaft to rescue another miner who had been overcome by bad air. After tying a rope to the stricken man so he could be raised to the surface, young Vickery passed out and was rescued in turn by his brother, Howard Vickery, 28. Both young men received a bronze medal and a diploma under the Association's "A-b" classification.

Pharoh and Noah Johnson, brothers of Wheelwright, Ky., were cited for heroism on the home front for rescuing another miner who had been trapped under fallen rock. Working speedily yet calmy, the Johnson brothers extricated the victim and dragged him 40 ft. to safety a few seconds before another stretch of roof caved in at the same place. For this they were awarded a bronze medal and a diploma under the "A-b" classification.

Other workers cited for outstanding personal performances included:

Frank Markosek Jr., medal and diploma, for saving the lives of seven miners following a mine explosion at Sunnyside, Utah. Class A-b.

John Kuchinsky and Harry Skibitski, medals and diplomas, for risking their lives

LA-DEL

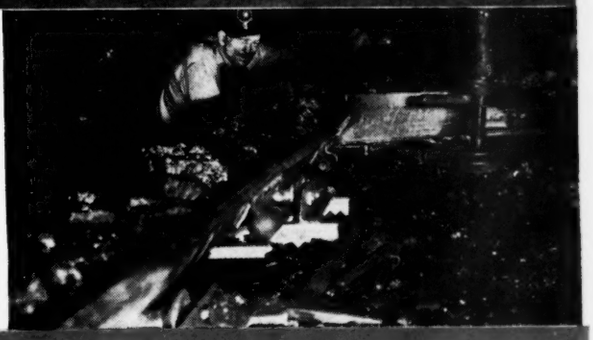
SHAKERS

FOR EASY OR DIFFICULT CONDITIONS

CUSHIONED DRIVE

GIVES LONGER LIFE— SMOOTH OPERATION
ECONOMY IN PRODUCTION

Because La-Del Shaker Conveyors are first *designed right*—then precision made and more than adequately powered—they move tonnage smoothly from the face with a minimum of maintenance or adjustment. They're ideal for close work in heavily timbered mines, low seams, steep floor slopes—in fact almost any mining condition. ● Available in many models and trough styles to suit easy or difficult conditions. Let us work with you for the best solution of *your* conveyor problems.



Right angle turns and curves offer no problems to La-Del Shaker Conveyors. Tonnage moves at equal speed around corners.

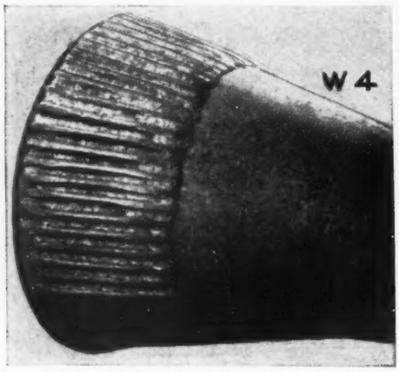
Consult a Joy Engineer

LA-DEL Division
JOY MANUFACTURING CO.
NEW PHILADELPHIA, OHIO

Crushing Costs Reduced by Conservation Welding . . . . .

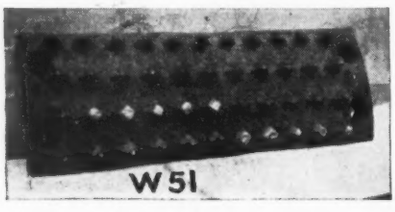
Wear is inseparable from the operation of crushing equipment, and an important factor in operating costs. For many years, the wearing parts subjected to impacts and abrasion have been made of austenitic manganese steel for the longest original life, but even "the toughest steel known," wears down in time in this brutal service.

Costs have been substantially reduced by the reclamation of crusher and pulverizer wearing parts with



Amsco Welding Products, which are so tough and durable that salvaged parts often last longer than the original castings.

W-4 shows a rehabilitated manganese steel 128" crusher mantle. Amsco Nickel-Manganese Steel Filler Bars were swaged by hand to produce the proper contour, and then tacked onto the mantle, using Amsco Nickel-Manganese Steel Electrodes. All the



welds were peened thoroughly. The total cost was $275.00, and the user subsequently reported that the rebuilt mantle lasted as long as a new one.

W-51 is a roll crusher segment used in a coal preparation plant. The rebuilding job is in progress on this segment; one where the worn teeth have been built up repeatedly to their original height with Amsco Nickel-Manganese Steel Welding Rod and then surfaced with Economy Hardface. The Economy welded cap is hammered to a point while the weld metal is still hot.

W-12 compares two manganese steel pulverizer hammers worn down from crushing rock. The hammer on the left has been built up with Amsco Nickel-Manganese Steel Electrodes, after which Economy Hardface was applied to the surface of the weld metal.

In cases where drastic attrition more than heavy shocks is the destructive force, it is economical to hardface new manganese steel castings.

Write for complete details on Amsco Welding Products.

(Amsco Welding Products are produced and sold in Canada by Canadian Ramapo Iron Works, Inc., Niagara Falls, Ontario.)

AMSCO

Foundries at

Chicago Heights, Ill.; New Castle, Del.;

Denver, Colo.; Oakland, Calif.;

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Offices in Principal Cities

AMERICAN MANGANESE STEEL DIVISION

CHICAGO HEIGHTS • ILLINOIS

AMERICAN Brake Shoe COMPANY

in rescuing a fellow-worker from a fall of rock in a mine at Inkerman, Pa. Class A-b.

Arthur Rumley, medal and diploma, for saving the life of a man by knocking him from a live trolley and assisting in giving artificial respiration at Chattaroy, W. Va. Class B-d.

Theodore King, Elm Grove, W. Va., a medal and diploma for saving the life of a brakeman by knocking him from a live trolley wire. Class B-d.

Gus Trent, Hetzel, W. Va., medal and diploma, for leadership in leading to safety a group of 11 men who were trapped by a mine fire. Class A-b.

Gilbert Blackledge, Monongahela, Pa., and John B. Clark, Pittsburgh, Pa., diplomas under Class D-a for "assisting with others collectively at personal risk to save or attempt to save the lives of one or more persons".

The following persons were awarded diplomas under Class D-b for "exhibiting skill in time of emergency in the application of modern methods and devices in saving lives": E. E. Morrison and Sam J. Henry, Chattaroy, W. Va.; Eugene Slick, Carbondale, Pa.; John Lesko, Adah, Pa.; Henry Robertson, Nathaniel Dunn, Edward Eisentrout and Frank Robertson, Midland, Md.

For saving a group of trapped miners in a mine at Lynch, Ky., and leading them to safety, the following men were awarded diplomas in Class D-b: Luther Cook, B, H. Mills, J. B. Thompson, E. B. Jenkins and Edward Gallagher.

Certificates of honor for extraordinary achievements in safety were awarded to the following coal mines:

Dolomite No. 3 mine, Woodward Iron Co., Woodward, Ala.
Rockvale No. 3 mine, Colorado Fuel & Iron Corp., Canon City, Colo.
Robinson No. 4 mine, Colorado Fuel & Iron Corp., Farr, Colo.
Kebler Mine, Colorado Fuel & Iron Corp., Tioga, Colo.
Somerset mine, Calumet Fuel Co., Somerset, Colo.
No. 15 mine, Consolidated Coal Co., White City, Ill.
No. 3 mine, Superior Coal Co., Mt. Clare, Ill.
Blue Diamond mine, Blue Diamond Coal Co., Blue Diamond, Ky.
Wheelwright Mine, Inland Steel Co., Wheelwright, Ky.
Maryland Division, Consolidation Coal Co.
Jeddo-Highland Coal Co., Jeddo, Pa.
Jermyn-Green Coal Co., Pittston, Pa.
Russellton mine, Republic Steel Corp., Russellton, Pa.
No. 4 mine, Jones & Laughlin Steel Corp., Rickeyville, Pa.
No. 5 Mine, Jones & Laughlin Steel Corp., Vestaburg, Pa.
Jones & Laughlin Steel Corp., California, Pa.
Reitz Coal Co., Windber, Pa.
Isabella mine, Weirton Coal Co., Isabella, Pa.
Clymer No. 2 mine, New York Central R. R. Co., Clymer, Pa.
The Buckeye Coal Company, Nemacolin, Pa.
Consolidation Coal Co., Mines in Pennsylvania.
Sonman "E" mine, Koppers Coal Division, Sonman, Pa.
No. 91 mine, Industrial Collieries Corp., Slickville, Pa.
Pennsylvania operations, Industrial Collieries Corp., Bethlehem, Pa.
Crescent mine, Pittsburgh Coal Co., Daisytown, Pa.
Ocean mine, Pittsburgh Coal Co., Smithton, Pa.
Euclid mine, Pittsburgh Coal Co., Fitz Henry, Pa.
Solar mine, Pittsburgh Coal Co., Imperial, Pa.
Somers mine, Pittsburgh Coal Co., Pricedale, Pa.
Warden mine, Pittsburgh Coal Co., Sutersville, Pa.
Montour No. 4 mine, Pittsburgh Coal Co., Lawrence, Pa.
Magee mine, Westmoreland Coal Co., Yukon, Pa.
Hutchinson mine, Westmoreland Coal Co., Herminie, Pa.
McCullock mine, Westmoreland Coal Co., Claridge, Pa.
Export mine, Westmoreland Coal Co., Ex-

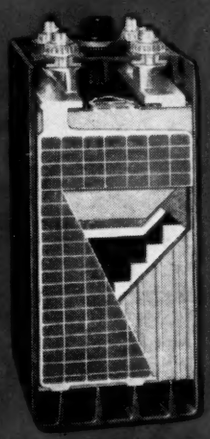
MEMO

Why aren't we using Kathanode batteries?

GENERAL MANAGER

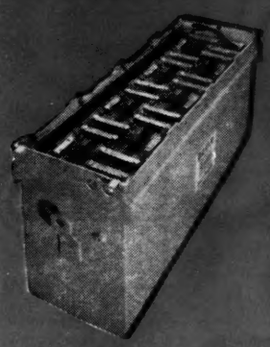
DO YOU KNOW WHY THE TREND IS TOWARD

Glass Mat Design?



KATHANODE CELL

This cut-away view shows the many parts in a complete Kathanode cell. Each is the subject of constant research.



GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.

Factories: Atlanta • Boston • Chicago Dallas • Depew • Leavenworth • Los Angeles • North Bergen • Rock Island Saint Paul • Salem • Sioux City Zanesville

Gould Kathanode power was a startling innovation when introduced to American industry in 1925. Since then the demonstrated superiority of glass mats has resulted in wide-spread use of this form of positive plate protection.

During its 21 years of experience, research and field testing Gould has added many improvements to the original Kathanode design. Incorporated in the now-famous Kathanode Unit, and still exclusively Gould, are a specially designed grid, long lasting Black Oxide active material, mats of layered spun-glass, and the Unit-Seal envelop that minimizes short circuits and internal power losses.

Gould research is constant so look to Gould for leadership in battery developments. Write Dept. 115 for Catalog 300 on Gould Kathanode Glassklad Batteries for Mine Shuttle Car Service.

GOULD

GLASSKLAD CONSTRUCTION

KATHANODE

TIES LAST LONGER...

WITH LESS MAINTENANCE AND GREATER SAFETY

...WHEN TREATED WITH "CZC"

More and more mine-management men are insisting on "CZC"-treated ties in their haulageways. They have learned from experience that Du Pont Chromated Zinc Chloride gives ties longer life and, because of this, pays for itself many times.

Accidents and replacements caused by decay-weakened timbers and ties are greatly reduced wherever "CZC"-treated wood is used, because wood that has been pressure-impregnated with "CZC" *resists decay*. In addition, it is resistant to fire, is clean, odorless, and safe to handle. Maintenance costs are lowered; man hours are saved; safety is greater.

For top efficiency in your mine, specify "CZC"-treated wood—from roof timbers to haulageway ties. In the meantime, write for detailed information on this wood preservative that makes wood last longer. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Wilmington 98, Del.

DU PONT CZC

Chromated Zinc Chloride

WOOD PRESERVATIVE

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port, Pa.
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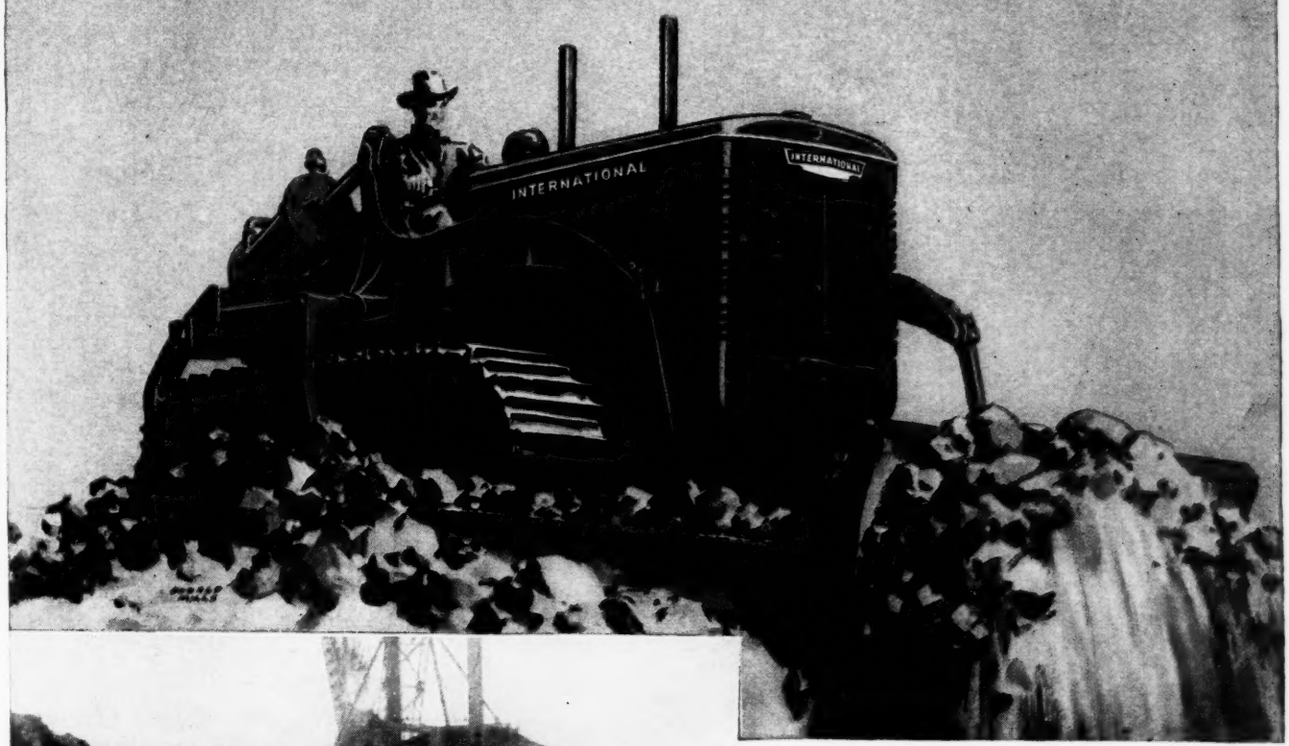
Beech Bottom mine, Windsor Powerhouse Coal Co., Windsor Heights, W. Va.
Bunker mine, Davis-Wilson Coal Co., Morgantown, W. Va.
Pinnacle mine, American Coal Co., McComas, W. Va.
Arkwright mine, Consolidation Coal Co., Mona, W. Va.
Mine No. 97, Consolidation Coal Co., Rivesville, W. Va.
Mine No. 63, Consolidation Coal Co., Monongah, W. Va.
Mine No. 38, Consolidation Coal Co., Fairmont, W. Va.
Olga No. 1 mine, Carter Coal Co., Coalwood, W. Va.
No. 9 mine, Carbon Fuel Company, Carbon, W. Va.
No. 2 mine, Chafin-Jones-Heatherman Coal Co., Peach Creek, W. Va.
McCandlish mine, Hutchinson Coal Co., Meadowbrook, W. Va.
Imperial No. 2 mine, Imperial Colliery Co., Burnwell, W. Va.
No. 20 mine, Island Creek Coal Co., Whitman, W. Va.
No. 7 mine, Island Creek Coal Co., Holden, W. Va.
Kopperston No. 1 mine, Koppers Coal Division, Kopperston, W. Va.
Mine No. 2, United States Coal & Coke Co., Gary, W. Va.
No. 4 mine, West Virginia Coal & Coke Co., Omar, W. Va.
Monarch mine, Sheridan-Wyoming Coal Co., Monarch, Wyo.
Winton No. 7½ mine, Union Pacific Coal Co., Winton, Wyo.
Hanna No. 4 mine, Union Pacific Coal Co., Hanna, Wyo.

Certificates of honor were given to the following individuals for long-time service in promoting health and safety in mining and the mineral industries and for supervising the work of others:

H. W. Payne, superintendent American Coal Co., McComas, W. Va.; Joe E. Smith, Franklin Coal Mining Co., Powhatan, Ala.; James Bennett, Hayden Coal Co., Haybro, Colo.; J. E. Harvey, Oak Creek, Colo.; Enock Davis, Moffat Coal Co., Oak Creek, Colo.; Charles Stark, Oak Creek, Colo.; Joseph Allen, Palisade, Colo.; Marion W. Cox, Duquoin, Ill.; Enock Crolley, Koppers Coal Co., Weeksbury, Ky.; Isaac Six, Hocking Valley Mining Co., Nelsonville, Ohio; James E. Tipton, Senecaville, Ohio; Robert Whitmore Jones, Koppers Coal Division, Portage, Pa.; Paul Patrick, coke and tipple foreman, Republic Steel Corp., Brownsville, Pa.; Curtis Reddecliff, assistant foreman, Industrial Collieries Corp., Johnstown, Pa.; Ulyssess G. Daniels, Industrial Collieries Corp., Johnstown, Pa.; John T. James, New York Central R. R., Commodore, Pa.; E. A. Ringbloom, Freeport, Pa.; John Askey, Pittsburgh Coal Company, Scottdale, Pa.; W. K. Lambie, superintendent, Pittsburgh Coal Co., Belle Vernon, Pa.; Nathaniel Kirk, foreman, Pittsburgh Coal Co., Montour No. 4 mine, Canonsburg, Pa.; Kenneth Carothers, foreman, Pittsburgh Coal Co., Somers Mine, Pricedale, Pa.; George Block, Pittsburgh Coal Co., Lawrence, Pa.; David Underwood, Pittsburgh Coal Co., McDonald, Pa.; Martin Slak, Pittsburgh Coal Co., Joffre, Pa.; David Mouton, Pittsburgh Coal Co., Midway, Pa.; John Ferris, Pittsburgh Coal Co., Pricedale, Pa.; Harry Neatby, Pittsburgh Coal Co., West Newton, Pa.; Ishmael Pensis, Pittsburgh Coal Co., McDonald, Pa.; William Dainty, Pittsburgh Coal Co., West Newton, Pa.; John Bartos, Pittsburgh Coal Co., Imperial, Pa.; Roland Cresswell, Pittsburgh Coal Co., Coal Center, Pa.; Daniel Davis, Pittsburgh Coal Co., Houston, Pa.; William Garrett, Pittsburgh Coal Co., Elco, Pa.; George Bateman, Pittsburgh Coal Co., Smithton, Pa.; Dominick Dioni, Pittsburgh Coal Co., Lawrence, Pa.; William Murphy, superintendent, Euclid and Warden mines, Pittsburgh Coal Co., Perryopolis, Pa.; H. E. Mauck, superintendent, Pittsburgh Coal Co., Westland mine, Hickory, Pa.; Thomas G. Ferguson, superintendent, Pittsburgh Coal Co., Montour No. 4 mine, Houston, Pa.; Elmer Scales, Pittsburgh Coal Co., Sutersville, Pa.; Simon Lux, Pittsburgh Coal Co., West Newton, Pa.; Nick Konecheck, Pittsburgh Coal Co., Belle Vernon, Pa.; John Stapleton, Alloy, W. Va.; J. C. Constable, superintendent, Consolidation Coal Co., Fairmont, W. Va.; Primes Prude, Consolidation Coal Co., Monongah, W. Va.; Charles W. Welty, assistant foreman, Industrial Collieries Corp., Fairmont, W. Va.; Peter P. Sharon, assistant foreman, Industrial Collieries Corp., Barrackville, W. Va.; Al-

(*Continued on page* 188)

Plan for PEAK PRODUCTION with INTERNATIONAL HARVESTER POWER



NEARLY 600,000,000 tons of coal will be needed each year for several years to satisfy the demands of reconverted American industry. That means plenty of power will be needed for peak coal production—power that can deliver the goods with down-to-earth economy.

Strip mine operators are turning more and more to International Diesel Crawlers for their mobile power needs. Equipped with bulldozers, scrapers and 'dozer shovels, these rugged, efficient crawlers master the toughest jobs with a minimum of maintenance. Internationals *stand up* under the hardest work.

Get the facts you need about Internationals from your International Industrial Power distributor. You'll find these power-packed crawlers are the logical answer to your mobile power problem.

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5 out of 6 DEEP MINES use CP

which won Production or Efficiency Awards in "Coal-for-Victory Award Plan" 1944-1945

Four CP Post-Mounted Electric Coal Drills, five CP Hand-Held Models meet requirements of any drilling conditions — efficiently and economically.

No. 571 PERMISSIBLE HAND-HELD COAL DRILL

This is the famous "Whippet", the world's fastest electric coal drill, of which the permissible type weighs only 43 pounds. The adjustable safety clutch, auger chuck, motor and gears are completely enclosed in streamlined housings. The open type drill weighs 40 pounds.

Removal of dead handle permits parallel drilling within two inches of either top or bottom. In the softer seams, one man can easily handle the "Whippet" without fatigue.

No. 572 OPEN TYPE HAND-HELD COAL DRILL

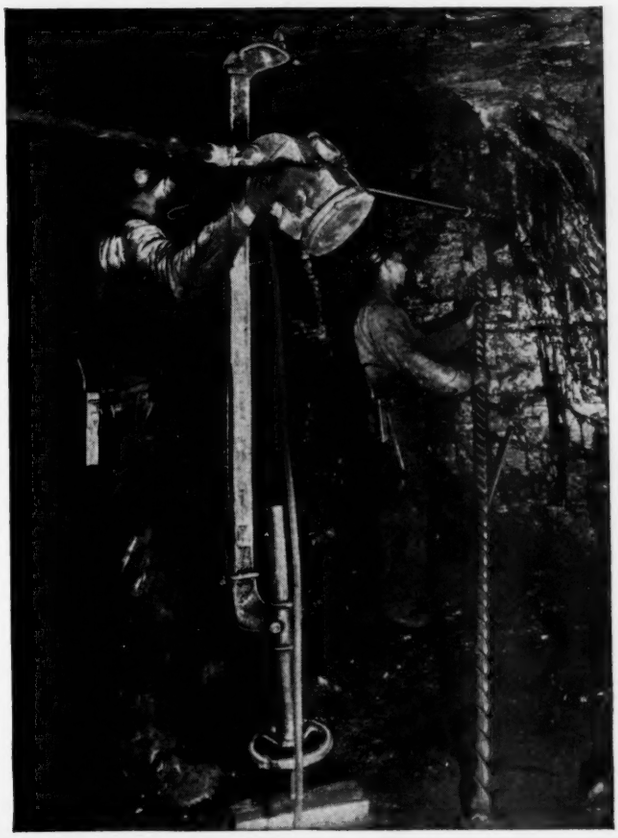
In seams noted for hard drilling, this exceedingly fast type of drill has drilled holes up to seven feet deep in ninety seconds or less. Available with or without safety clutch.

The No. 572 Open Type drill differs only from the Permissible Type in its open type switch. In its construction, the motor, brush rigging and brushes are entirely enclosed — a highly desirable feature.

Little Giant Coal Drills

No. 473 OPEN TYPE POST-MOUNTED COAL DRILL

This powerful drill is recommended for conditions where strength, high speed drilling and durability are essentials, and where weight is not so important. CP No. 473 Open Type Post-Mounted Drill has three ratios of drilling speeds, and a drilling rate up to 65 inches a minute in coal.



No. 574 PERMISSIBLE POST-MOUNTED COAL DRILL

With drilling speeds up to 40 inches per minute, CP No. 574 Permissible Post-Mounted Coal Drill easily is capable of drilling 40 to 60 holes per shift. Powerful and economical to operate, its maintenance is very low.

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For complete information on CP Post-Mounted Electric Coal Drills write for Catalog 901; for data on CP Hand-Held Drills, write for Catalog 902; on the CP "Whippet" write for S. P. 1995.

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Men Who Know Shovels Say-

"BUCKEYE CLIPPERS ARE 'TOPS' ON ANY JOB!"

OPERATORS SAY: "They're sweet jobs because they handle so easily!"

Their long, wide crawlers and correct balance provide easy maneuverability. Positive chain crowd moves any load. "Mevac" metered vacuum power control, gives instant, smooth response—"real feel."

MECHANICS SAY: "We know very little about Buckeye Clippers. They must be rugged, because they're so seldom down for repairs."

Right! Clippers have the in-built stamina to "stand the gaff" on the toughest work. Every part and material — clutches, brakes, bearings — is tested to assure plenty of capacity. All components easy to get at.

OWNERS SAY: "They cut costs to the bone! They're wizards at turning out big yardages at lower overall costs."

Buckeye better engineering and fast, efficient "Mevac" control permits Clippers to clip time off the operating cycle. Gasoline, diesel or electric powered Clippers increase yardages — cut costs.

- √ ½ and ¾ Yard
- √ Completely Convertible
- √ "Mevac" Vacuum Power Control
- √ Rugged Construction—Low Cost Operation

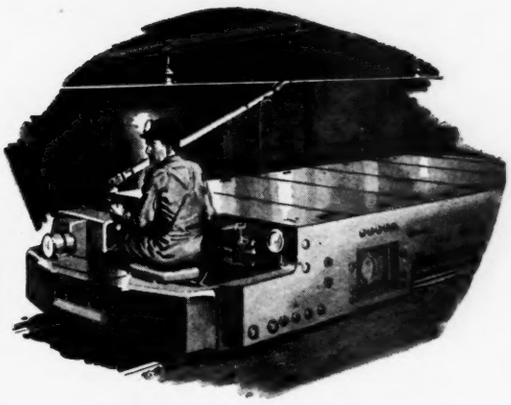
Check the performance of Buckeye Clippers for low cost material handling, stripping and excavation.

BUCKEYE TRACTION DITCHER COMPANY
FINDLAY, OHIO

built by **Buckeye**

CONVERTIBLE SHOVELS—BULLDOZERS—ROAD WIDENERS
TRENCHERS—MATERIAL SPREADERS—R-B FINEGRADERS

Pay-off in pulling power!



It's pulling power that pays off in mine locomotive operation . . . quick get-away with heavy loads . . . more tons per trip . . . more trips per shift!

The cut-away illustration below shows how correct lubrication by Socony-Vacuum can help your locomotives maintain maximum pulling power, with less cost for maintenance.

Those axle roller bearings, for instance, must operate under heavy loads, with minimum attention. Gargoyle BRB Grease provides strong lubricating films that withstand rupture and deterioration . . . keep bearings rolling freely! In addition, it minimizes leakage . . . eliminates frequent re-packing.

Those enclosed drive gears need a heavy-duty oil that will stick to the teeth in spite of the jarring shocks of starting and the squeezing pressures of heavy hauls. Viscolite No. 10 Fluid has been developed for this service.

For the motor support bearings, lubricated from waste-packed reservoirs, Viscolite Extra-Heavy is recommended.

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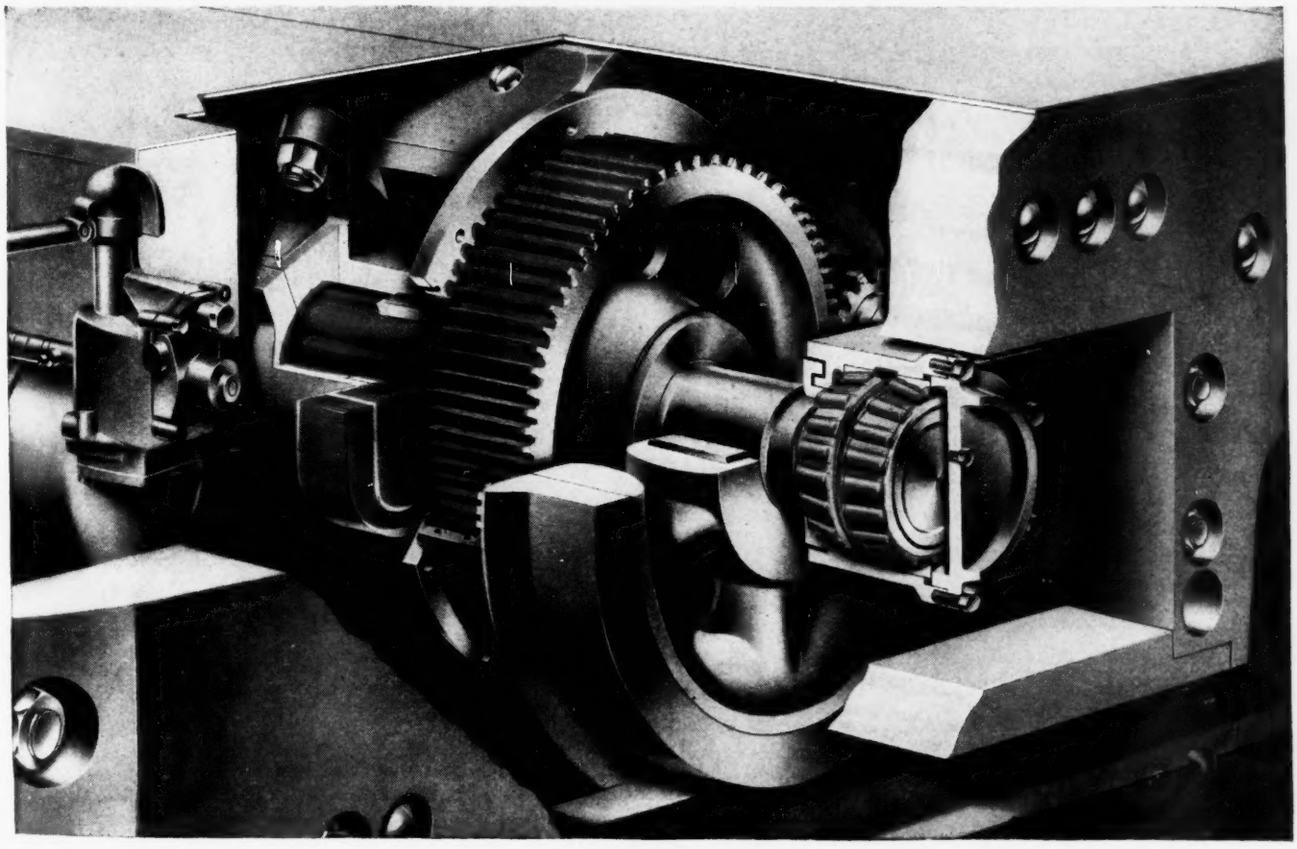
See your Socony-Vacuum Representative for expert help on all mine lubrication problems.

This drawing prepared with cooperation of Goodman Mfg. Co.



Get this Complete Lubrication Program for all your machines

- Lubrication Study of Your Entire Plant
- Lubrication Schedules and Controls
- Recommendations to Improve Lubrication
- Skilled Engineering Counsel
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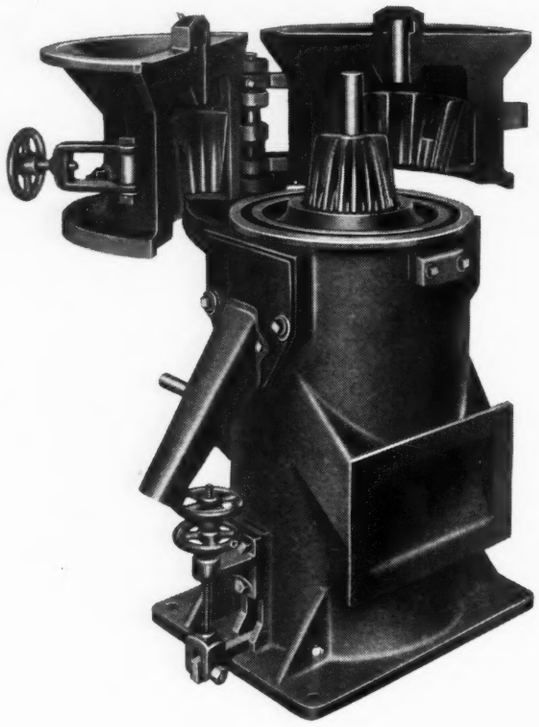

Sample 1 Ton of Coal in 1 Hour Automatically with

STURTEVANT
COAL SAMPLERS

★ Speed Sampling by Eliminating 32 Hand Operations

★ Provide Accurate Representative Samples in a Few Minutes

★ Quickly Pay for Themselves Out of Savings

There is no need to guess about the BTU value of coal . . . not when you can get accurate samples in a few minutes with the Sturtevant Automatic Coal Sampler.

Here's how it works . . . coal is fed into the sampler where it is reduced, crushed and mixed automatically so that it is truly representative of any given lot. The resulting analysis gives a true picture of the coal avoiding any possibility of misunderstanding between the supplier and user of the coal.

Write for bulletin and full information today.

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MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

MEETINGS

• **Stoker Manufacturers' Association: annual meeting, June 3 and 4, Broadmoor Hotel, Colorado Springs, Colo.**

• **Mine Inspectors' Institute of America: 26th annual convention, June 3-5, Sterling Hotel, Wilkes-Barre, Pa.**

• **American Coal Sales Association: annual convention, June 6-8, Homestead Hotel, Hot Springs, Va.**

• **Rocky Mountain Coal Mining Institute: annual meeting, June 6, 7 and 8, Denver, Colo.**

• **Big Sandy Elkhorn Coal Operators Association: annual meeting June 7, Ashland, Ky.**

• **American Retail Coal Association: annual convention, June 11 and 12, Morrison Hotel, Chicago.**

• **West Virginia Coal Mining Institute: meeting June 14, Hotel Prichard, Huntington, W. Va.**

• **American By-Product Coke Institute: annual meeting, June 17 and 18, Seaview Country Club, Absecon, N. J.**

• **Mineral Producers Association: annual meeting June 21, William Penn Hotel, Pittsburgh, Pa.**

• **Illinois Mining Institute: summer meeting on steamer "Golden Eagle," leaving St. Louis, Mo. Friday, June 21, 10:30 p.m. and returning to St. Louis Sunday morning, June 23.**

• **Southern Appalachian Industrial Exhibit: sponsored by the Pocahontas Electrical and Mechanical Institute, Aug. 22, 23 and 24, Bluefield, W. Va.**

• **American Institute of Mining and Metallurgical Engineers: 75th anniversary meetings, Sept. 16-18, Waldorf-Astoria Hotel, New York City.**

• **Fifth Anthracite Conference of Lehigh University: May 8 and 9, 1947, Bethlehem, Pa. (Postponed from the previously announced dates of Sept. 12 and 13, 1946.)**

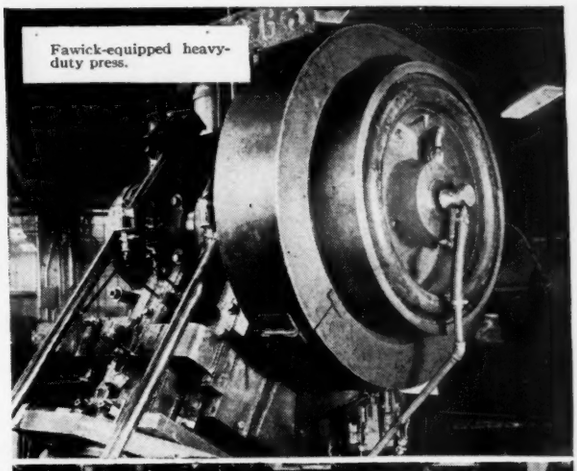
bert E. Smith, assistant foreman, Industrial Collieries Corp., Barrackville, W. Va.; Oliver Kisner, assistant foreman, Industrial Collieries Corp., Barrackville, W. Va.; Earl H. Dodrill, assistant foreman, Industrial Collieries Corp., Barrackville, W. Va.; Brack Young, The New River Co., Mt. Hope, W. Va.; O. D. Bunch, The New River Co., Summerlee, W. Va.; James Blair, The New River Co., Sprague, W. Va.; M. D. Bouldin, superintendent, Imperial Colliery Co., Burnwell, W. Va.; W. H. Cooke, superintendent, Chafin-Jones-Heatherman Coal Co., Peach Creek, W. Va.; Eddie Jones, superintendent, West Virginia Coal & Coke Co., Omar, W. Va.; C. H. Jenkins Jr., superintendent, Hutchinson Coal Co., Meadowbrook, W. Va.; T. E. Mitchem, superintendent, Island Creek Coal Co., Whitman, W. Va.; E. W. St. Clair, superintendent, Davis-Wilson Coal Co., Morgantown, W. Va.; Jess Halstead, Wyatt Coal Co., Sharon, W. Va.; James Stamper, Webb Coal Mining Co., Garrison, W. Va.; R. G. Merrill, division electrician,

HOW WELL DO THEY WORK? HOW MUCH DO THEY COST?

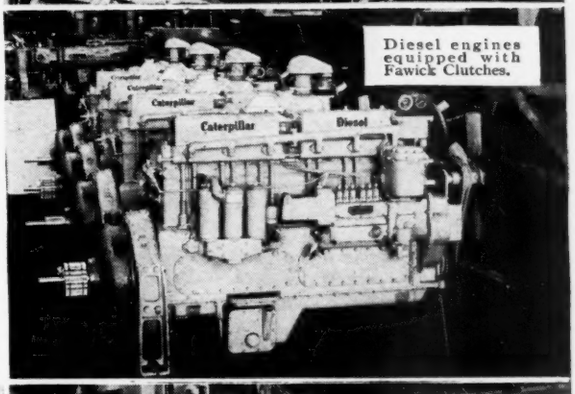
Both of these important questions about Clutches for heavy-duty drives are answered—*in your favor*—by Fawick Airflex Clutches.

1. They absorb shock and vibration, and transmit power, through a cushion of air—just like your car rides on its tires.
2. They have no moving parts to wear or get out of adjustment—no springs, toggles, arms or levers.
3. They require no lubrication—maintenance costs are low.
4. They provide uniform clutch engagement under all loads, at all speeds.
5. Performance and economy have been proved—on thousands of navy ships and on hundreds of types of industrial applications.

Let our Engineering Department give you details—on clutches, slip clutches, brakes, flexible couplings and power take-offs.

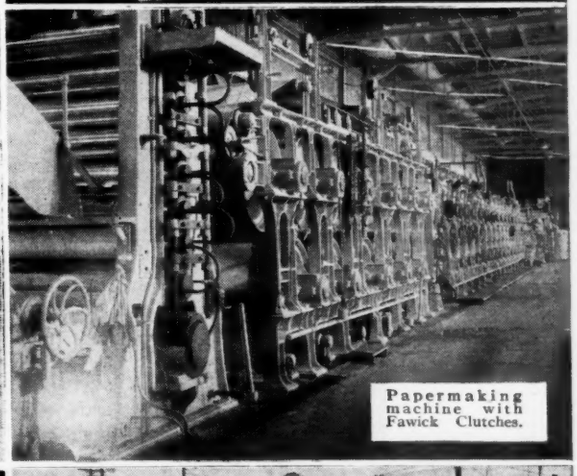


Fawick-equipped heavy-duty press.



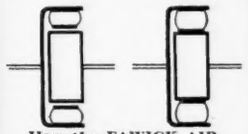
Diesel engines equipped with Fawick Clutches.

Fawick Clutches save time and money on big dredges.

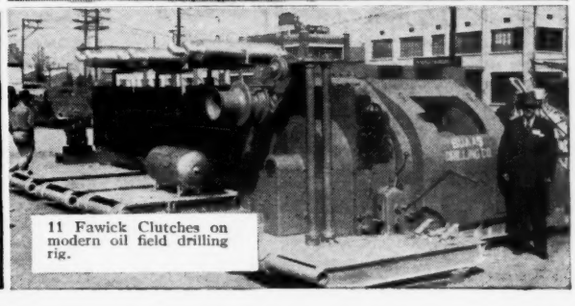


Papermaking machine with Fawick Clutches.

Fawick-equipped logging crane.



How the FAWICK AIRFLEX CLUTCH Works. Compressed air expands the rubber-and-fabric gland—to engage clutch with any degree of "grip" you want. Release the air and clutch disengages.

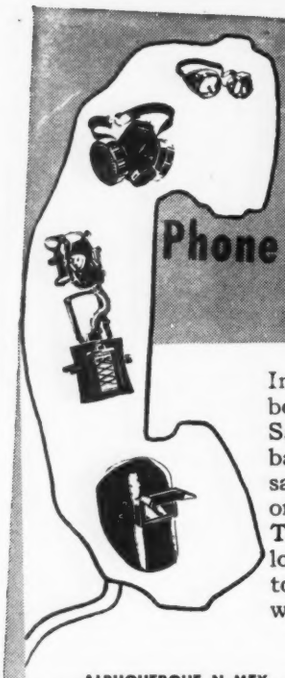


11 Fawick Clutches on modern oil field drilling rig.

FAWICK *Airflex* CLUTCH

FAWICK AIRFLEX CO., INC. • 9919 Clinton Road, Cleveland 11, Ohio

In Canada, Reynold-Coventry Ltd., Montreal, Toronto, Vancouver • In Britain, Crofts Engineers, Ltd., Bradford, England



For Prompt Service on

SAFETY Equipment

Phone your Willson Distributor

In this list you'll find one of your neighbors—a distributor of WILLSON Personal Safety Equipment. That distributor, backed by our 75 years experience in safety service, is well qualified to help you on any eye and respiratory safety problem. That distributor, in addition, maintains a local stock of WILLSON safety equipment to give you what you want—when you want it.

ALBUQUERQUE, N. MEX.—Hendrie & Bolthoff Mfg. & Supply Co.
ATLANTA, GA.—Fulton Supply Co.
BALTIMORE, MD.—Carey Mach. & Sup. Co.
BIRMINGHAM, ALA.—Safety Engineering & Supply Co.
BOSTON, MASS.—Cutter, Wood & Sanderson Co.
BUFFALO, N. Y.—American Allsafe Co.
BUTTE, MONT.—Montana Hardware Co.
CASPER, WYO.—Casper Supply Co.
CHARLESTON, S. C.—Cameron & Barkley Co.
CHARLESTON, W. VA.—Safety First Supply Co.
CHATTANOOGA, TENN.—C.D. Genter Co.
CHICAGO, ILL.—Protective Equipment, Inc.
CINCINNATI, OHIO—The E. A. Kinsey Co.
CLEVELAND, OHIO—Safety First Supply Co.
COLUMBUS, OHIO—The E. A. Kinsey Co.
DAYTON, OHIO—The E. A. Kinsey Co.
DEADWOOD, S. DAK.—Hendrie & Bolthoff Mfg. & Supply Co.
DENVER, COLO.—Hendrie & Bolthoff Mfg. & Supply Co.
DETROIT, MICH.—Willson Products, Inc.
GRAND RAPIDS, MICH.—F. Raniville Co.
GREENSBORO, N. C.—Smith-Courtney Co.
GREENVILLE, S. C.—Carolina Sup. Co.
HICKORY, N. C.—Smith-Courtney Co.
HOUSTON, TEXAS—Allied Safety Equipment Co.
INDIANAPOLIS, IND.—The E. A. Kinsey Co.
JACKSONVILLE, FLA.—Cameron & Barkley Co.
KANSAS CITY, KANS.—L.R. Stone Supply Co.
LOS ANGELES, CALIF.—E. D. Bullard Co.
LOUISVILLE, KY.—Neill-LaVielle Sup. Co., Inc.
MEMPHIS, TENN.—J. E. Dilworth Co.
MILWAUKEE, WIS.—Protective Equip., Inc.
MUSKEGON, MICH.—Factory Supply Co.
NEW ORLEANS, LA.—Woodward, Wight & Co., Ltd.
NEW YORK, N. Y.—W. S. Wilson Corp.
OKLAHOMA CITY, OKLA.—Hart Industrial Supply Co.
OMAHA, NEBR.—Interstate Mach. & Sup. Co.
PHILADELPHIA PA.—Industrial Prod. Co.
PITTSBURGH, PA.—Safety First Supply Co.
PORTLAND, ORE.—J. E. Haseltine & Co.
PROVIDENCE, R. I.—James E. Tierney
RICHMOND, VA.—Smith-Courtney Co.
ST. LOUIS, MO.—Safety Incorporated
ST. PAUL, MINN.—Farwell, Ozmun, Kirk & Co.
SALT LAKE CITY, UTAH—Industrial Supply Co., Inc.
SAN FRANCISCO, CALIF.—E. D. Bullard Co.
SANTA FE, N. MEX.—Hendrie & Bolthoff Mfg. & Supply Co.
SAVANNAH, GA.—Cameron & Barkley Co.
SCRANTON, PA.—L. B. Potter & Co.
SEATTLE, WASH.—J. E. Haseltine & Co.
SPOKANE, WASH.—J. E. Haseltine & Co.
SPRINGFIELD, MASS.—Charles C. Lewis Co.
SYRACUSE, N. Y.—Syracuse Supply Co.
TACOMA, WASH.—J. E. Haseltine & Co.
TAMPA, FLA.—Cameron & Barkley Co.
TROY, N. Y.—The Troy Belting & Sup. Co.
TULSA, OKLA.—Hart Ind. Supply Co.
VICKSBURG, MISS.—J. E. Dilworth Co.

CANADA

TORONTO—Safety Supply Co.
MONTREAL—Safety Supply Co.
VANCOUVER—Safety Supply Co.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS

DOUBLE **WILLSON**

PRODUCTS INCORPORATED
READING, PA., U.S.A. *Established 1870*

Tennessee Coal, Iron & R. R. Co., Edgewater, Ala.; L. B. Clouse, division electrician, Tennessee Coal, Iron & R. R. Co., Pratt City, Ala.; J. O. Riser, The New River Co., Carlisle, W. Va.; C. A. Lawson, Beckley, W. Va.

Coal Activity

Bituminous Coal Stocks

	Thousands Net Tons March 1 1946	—P.c. Change— From Feb. 1 1946	From March 1 1945
Electric power utilities	14,802	+ 2.9	+14.6
Byproduct coke ovens	6,423	+13.5	+14.5
Steel and rolling mills	704	+12.5	+ 5.7
Railroads (Class I)	11,069	+17.8	+ 8.6
Other industrials*	15,073	+ 7.7	+14.4
Total	48,071	+ 9.1	+12.7

Bituminous Coal Consumption

	Thousands Net Tons March 1 1946	—P.c. Change— From Feb. 1 1946	From March 1 1945
Electric power utilities	4,937	−13.5	−20.5
Byproduct coke ovens	3,638	−31.3	−48.7
Steel and rolling mills	396	−28.3	−58.0
Railroads (Class I)	9,547	−13.0	−11.1
Other industrials*	12,100	−13.6	− 7.8
Total	30,618	−16.2	−19.9

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

March, 1946, net tons	56,800,000
P.c. change from March, 1945	+8.3
January-March, 1946, net tons	160,850,000
P.c. change from Jan.-March, 1945	+4.6

Anthracite Production

March, 1946, net tons	5,492,000
P.c. change from March, 1945	+4.8
January-March, 1946, net tons	15,262,000
P.c. change from Jan.-March, 1945	+9.9

Sales of Domestic Stokers

February, 1946	13,947
P.c. change from January, 1946	+4.8
P.c. change from February, 1945	+154.5

Index of Business Activity*

Week ended April 27	171.0
Month earlier	170.0
Year earlier	231.3

* *Business Week*, May 4.

Electric Power Output†

Week ended, April 27, kw.-hr.	3,976,750,000
P.c. change from month earlier	−0.3
P.c. change from year earlier	−9.9

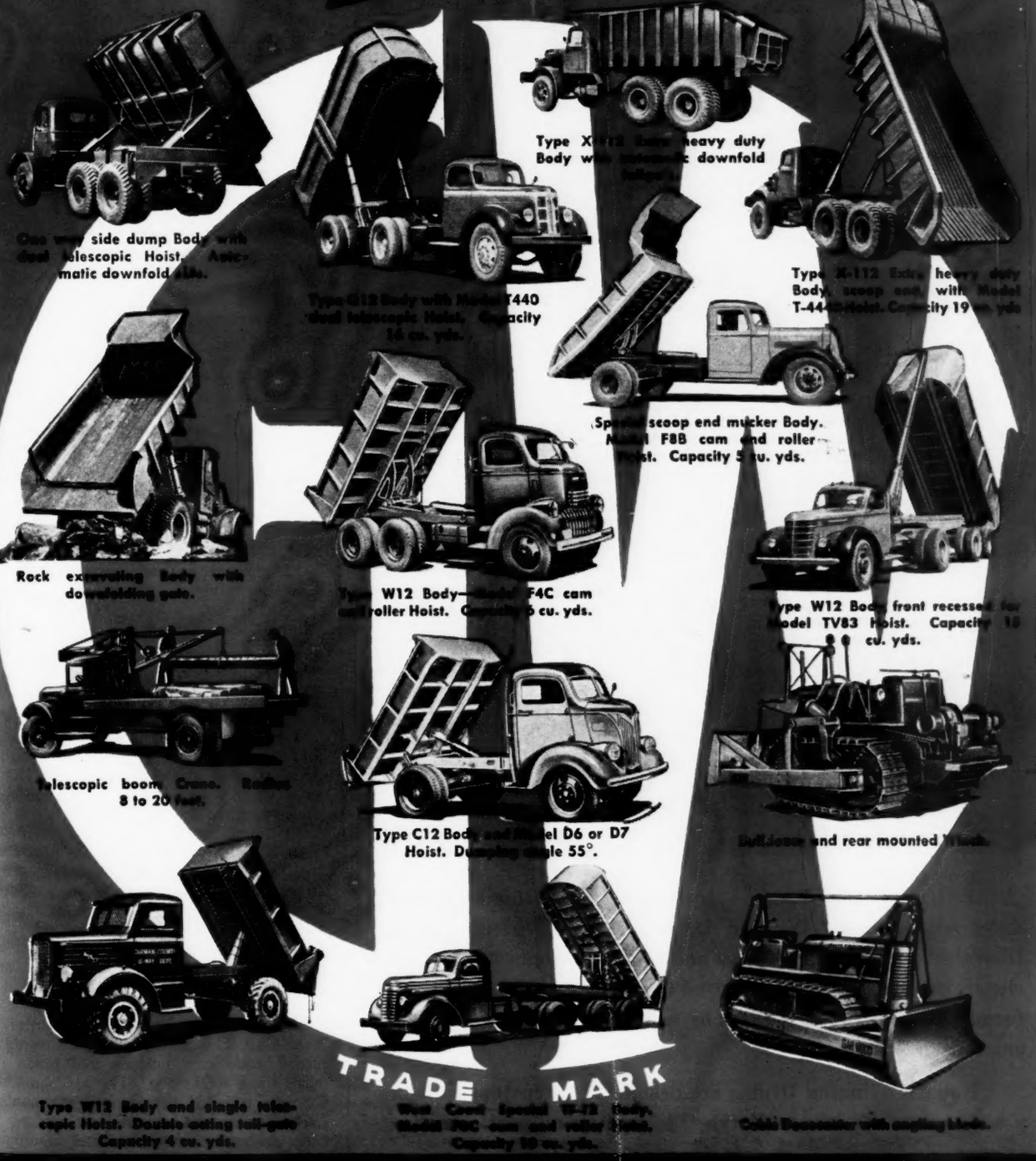
† Edison Electric Institute.

More Anthracite Urged on Miners

Renewing its appeal for increased man-day production as the answer to the anthracite industry's economic problems, the Philadelphia & Reading Coal & Iron Co., in a pamphlet message to its employes entitled "Across the Kitchen Table," announced by General Manager George A. Roos, asked its employes for "bread in the form of increased man-day production for our kitchen table. If we can get it, then it means bread, butter and a lot of other things for your kitchen table—things that we want you to have."

The company said these things "will come to you through doing your part to increase the operating efficiency of our mines and put us in the proper economic position to go out and battle the fierce

BETTER BUILT FOR BEST PERFORMANCE



TRADE MARK

GW TRADE MARK

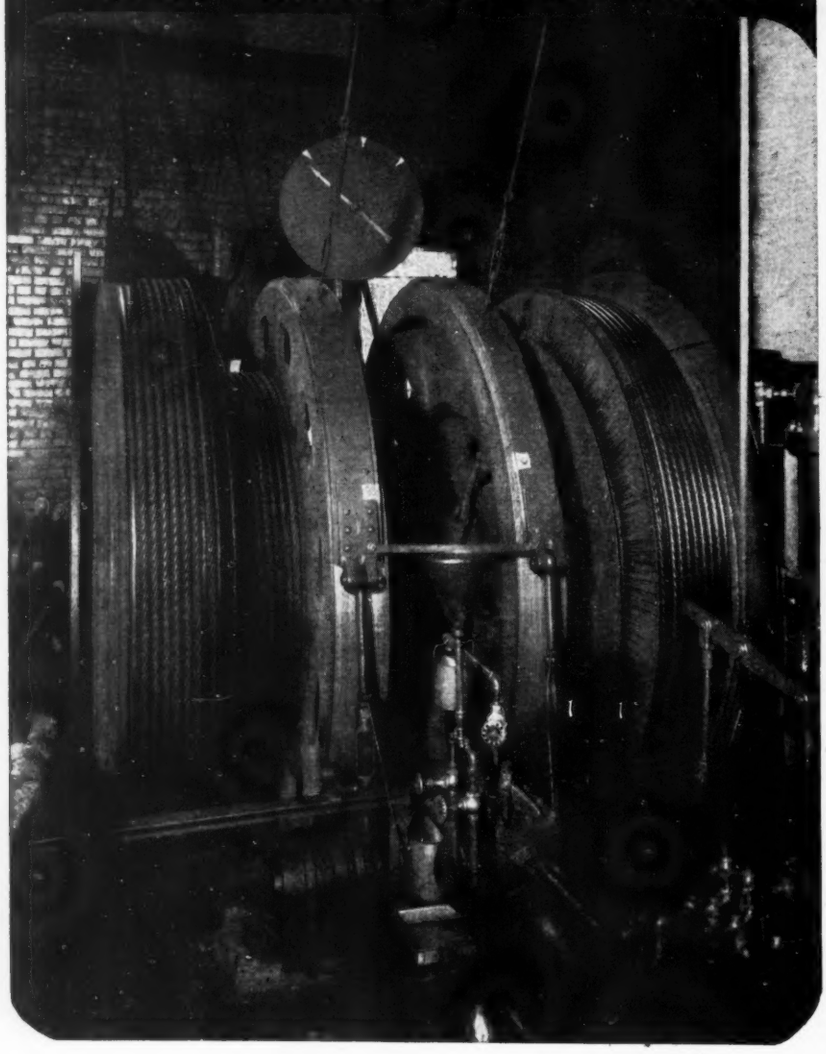
GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. • DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: TANKS • HEATING EQUIPMENT • MOTOR BOATS

"RAISING — EFFICIENCY"
"LOWERING - OPERATING COSTS"
with HOLMES WINDING DRUMS



Efficiency and tonnage go up and operating costs go down with Holmes' Winding Drums. Designed after careful time studies of hoisting cycles and practical engineering experience, they have now been proved by years of outstanding performance. Long life is assured by heavy duty construction and unusual rigidity.

Holmes' Winding Drums are designed and custom built in a wide range of sizes and styles, to meet your particular requirements.

ROBERT HOLMES AND BROS.
BINS GATES LOWERING SPIRALS DUST-O-LATORS SHAKING GATES
DANVILLE ILLINOIS

competition that is already descending upon us from oil, natural gas and bituminous coal."

Quoting an advertisement recently appearing in all anthracite newspapers under the auspices of the United Mine Workers of America, P. & R. stated that the union recognizes "as clearly as we do the simple fact that production per man per day in our mines is too low." The company pointed out that it is doing everything possible to perfect the situation from a management and engineering standpoint. It is not asking, the statement said, that contract miners produce more coal for the same money they now receive.

•

Safety Awards Made To Wheeling Employees

Presentation of 31 certificates of safety merit and of three 25-year service pins featured the annual supervisors' meeting of the Wheeling Township Coal Mining Co., Akron, Ohio, held recently at the General Custer Hotel, Cadiz, Ohio.

Cliff Slusser, vice president in charge of production, presented diamond-studded 25-year pins and an award of $100 each to C. A. Brown, local union president; Clyde Smith, tipple foreman, and Emmet Boggs, all of whom completed a quarter-century continuous service with the organization. Safety certificates, presented to the 31 supervisors, signified completion of a calendar year during which no lost-time accidents were charged against departments under their supervision.

•

Strip Pits Refilled by Operators

Two stripping operators last month joined with the Hudson Coal Co. in the policy of refilling Wyoming Valley Pennsylvania strip pits immediately on removal of the coal, in the interest of public health and safety.

In Edwardsville Borough the Bird Construction Co. began work on its pits under an agreement reached with borough officials, which avoided posting of a bond of $10,000 an acre required by an Edwardsville ordinance. Announced intention of enforcing the ordinance led to a conference and agreement between the company and officials.

At Nanticoke, Lawrence Biscontini & Sons Coal Co. began refills, following a pledge made city, business and union officials some weeks ago. The Hudson Coal Co. was reported considering extension to Larksville Borough of its refill policy long in effect at the foot of Wilkes-Barre mountain.

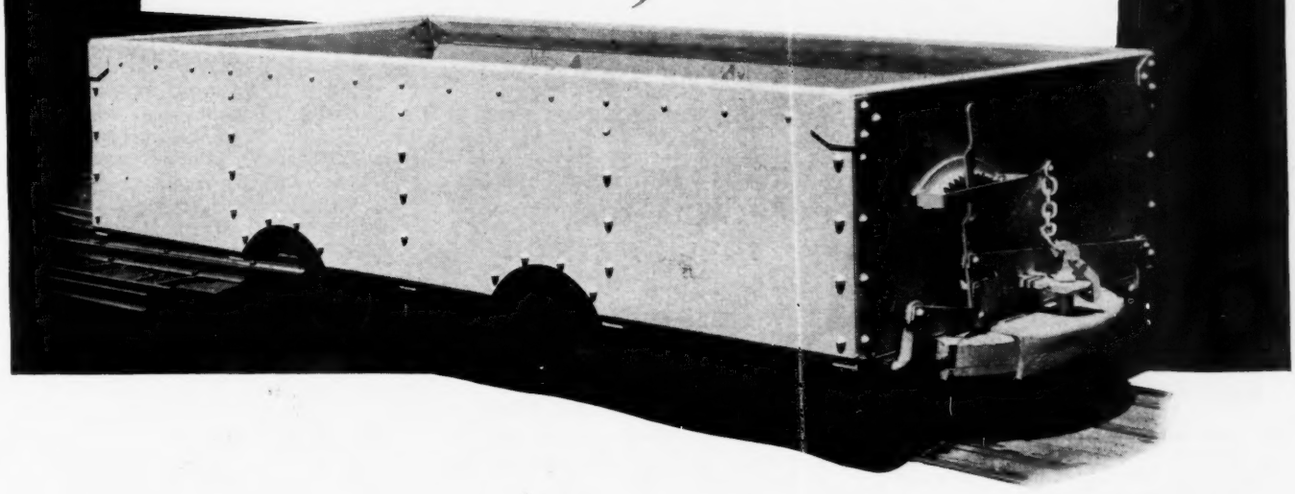
Officials of Pringle Borough were reported ready to enforce their ordinance regulating strip mining, which was passed some time ago and was the model for that of Edwardsville, if stripping operations are extended into the borough's limits as now expected. Other communities in this area were understood to be studying the results of the Edwardsville action and considering similar regulation.

When your mine cars are built with U·S·S COR-TEN

-you get these 5 life-increasing advantages

OVER PLAIN STRUCTURAL STEEL

1. **50% higher yield point**
2. **60% higher endurance limit**
3. **Greater resistance to shock**
4. **Greater resistance to abrasion**
5. **4 to 6 times more resistance to atmospheric corrosion**



ADD UP these superior mechanical properties and characteristics of U·S·S COR-TEN and you get the very good reason why more than a thousand of the 13,215 COR-TEN-built cars now in use have been in service for more than ten years.

The ruggedness and durability of this COR-TEN equipment, its ability to stand up under hard knocks and rough treatment account for the fact that 53% of all the COR-TEN cars in operation have been built on repeat orders—after the original cars had shown in actual service how much better they would stand the gaff.

Remember this: — With U·S·S COR-TEN, cars can be built stronger and longer lasting without increasing weight. Or, if you want to build lighter, you can reduce car weight hundreds of pounds with lightweight COR-TEN construction and your cars will be just as strong as the heavier plain steel cars they replace.

Now is the time to insure top efficiency in your equipment. Whether you do it by building cars stronger and longer lasting, or by reducing their weight, U·S·S COR-TEN will do it better and at the least increase in cost.

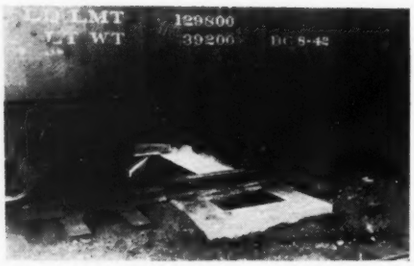
USS HIGH STRENGTH STEEL UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco* **NATIONAL TUBE COMPANY,** *Pittsburgh*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

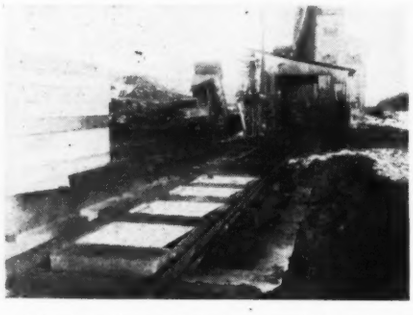
UNITED STATES STEEL

Frozen Coal Hopper Cars THAWED OUT in 20 Minutes



Note intense, glowing, radiant heat produced by Hauck Rapid Combustion Oil Burners firing from both sides of the refractory pit under the hopper. A Hauck Thawing Pit consists of complete burner equipment with plans for pit construction and piping details, easy to install.

Showing Hauck Burner firing from one side of the pit. Burners are regulated so that flame from the burners never touches the car hopper.



Showing four pits close together, for thawing three- and four-hopper cars. One man can readily operate as many as 12 pits.

HAUCK THAWING PITS

Speed Dumping of Coal

- SAVE TIME
- SAVE LABOR
- SAVE TROUBLE

RADIANT HEATING REPLACES OLD HAND TORCH METHOD

The success of the Hauto Coal Co. in thawing 20 cars of coal per shift (see "Coal Age," February, 1946) is the story of 35 other mines which have learned how to really get speed in dumping frozen coal cars, save time and labor and avoid car damage.

Radiant heat, produced by Hauck Oil Burners in refractory-lined pits, quickly and uniformly thaws two-, three- and four-hopper cars. No need for the old, tedious, expensive, inefficient and destructive method of blast heating with oil torches.

Reports show that fuel consumptions run from 8 to 12 gal. to thaw a car, at a cost of less than $1 for oil.

This indirect radiant heating—the Hauck way—not only avoids damage to hoppers, air brake cylinder packings, etc., but the coal has much less moisture content.

Users say their Hauck Thawing Pits have paid for themselves in one winter on labor savings alone. Investigate what they can do for you. Write for Bulletin No. 1040.

HAUCK THAWING EQUIPMENT

HAUCK MANUFACTURING CO.

Torch Burners · Thawers · Melting Kettles · Forges

111-121 TENTH STREET BROOKLYN 15, N. Y.

Coal Heating Service Shown to Salesmen

The first of a series of meetings to sell Coal Heating Service to the coal industry was held by Appalachian Coals, Inc. at the Netherland Plaza Hotel in Cincinnati, April 18. More than 200 sales executives and salesmen from all parts of the Appalachian market area attended.

Speakers at the meeting, which was opened by R. E. Howe, president, Appalachian Coals, Inc., were H. A. Glover, vice president, Island Creek Coal Sales Co., and M. L. Patton, president of Cabin Creek Consolidated Coal Sales Co., both of whom are members of the marketing committee of the National Coal Association which is in charge of the operation of Coal Heating Service; Frank G. Reed, director, American Retail Coal Association; W. C. Perkins, manager of sales, Appalachian Coals, Inc.; Dr. H. J. Rose, vice president and director of research, Bituminous Coal Research, Inc.; Ralph A. Sherman, supervisor of the fuels division, Battelle Memorial Institute; E. D. Benton, fuel engineer, L. & N. R.R.; and H. B. Lammers, director of engineering, the Coal Producers Committee for Smoke Abatement.

Charles R. Griffith, president, Southern Coal & Coke Co., was chairman of the morning session, and Earl C. Payne, consulting engineer of the Consolidation Coal Co., chairman of the afternoon session.

Mr. Glover pointed out that the plan of Coal Heating Service is admittedly a gigantic one, that it cannot be effectuated overnight. He said that probably every coal man in the country would have suggestions for changing the outline. "But it must be obvious" he said, "that in order to put this thing on a national scale a definite central plan must prevail. Our job is to sell that plan to the industry first. The producers and their sales forces must understand the plan before it can be expected to receive the cooperation of the retail coal merchants."

The next step, Mr. Glover explained would be training in improved merchandizing of coal. This probably will be accomplished by holding regional schools for wholesale salesmen. Chief among the items for improved merchandizing are better delivery methods, and improvements in convenience and satisfaction to consumers in their use of coal.

The third step in the plan, Mr. Glover stressed, would be publicity. "It is fundamental that before you can wage a successful advertising campaign you must have something to advertise. Coal Heating Service is new and revolutionary in the coal business and we will have plenty to advertise, including, among other things, 24-hour service to coal consumers.

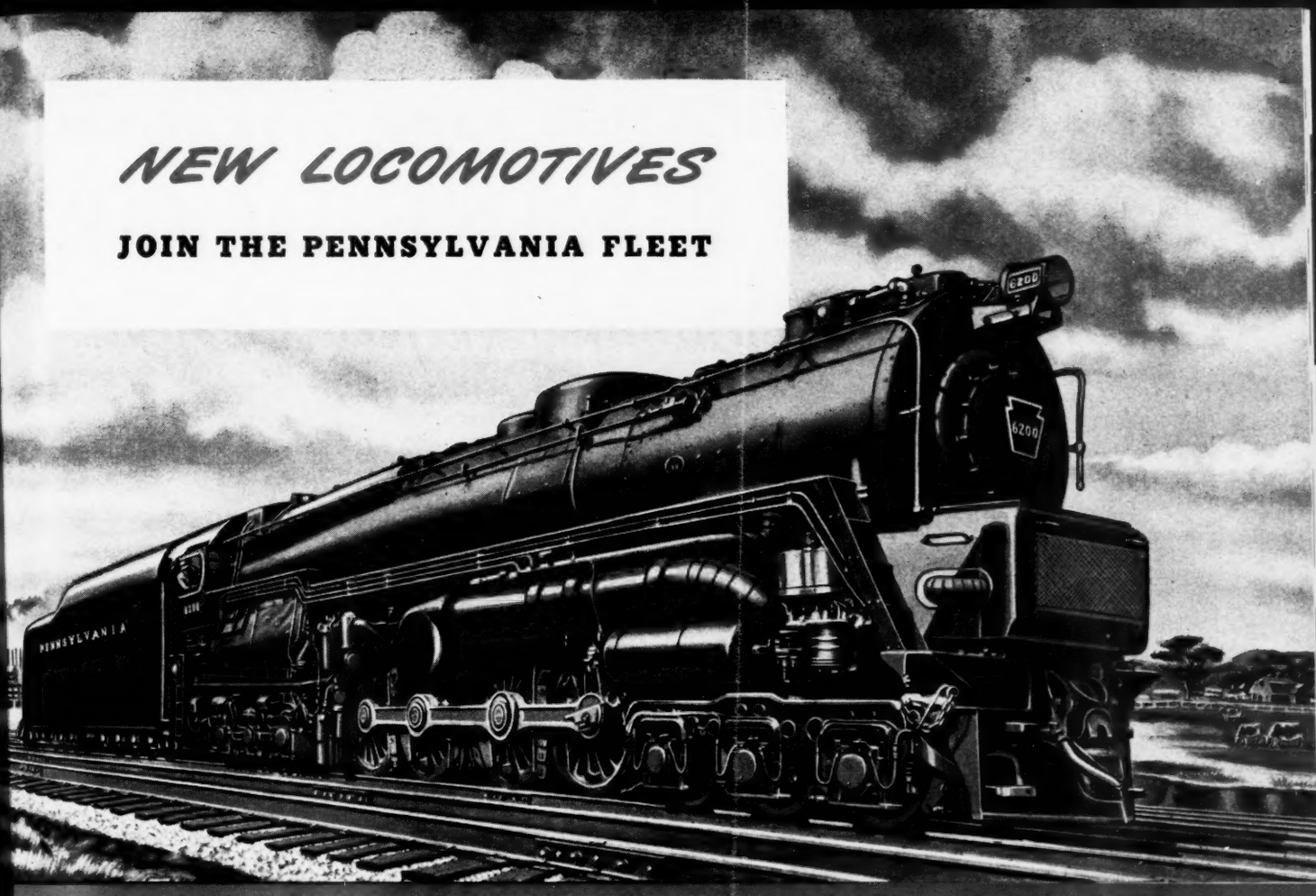
"Coal Heating Service," said Mr. Patton, "is essentially a partnership between coal producers, wholesalers and retailers, and since the whole objective of the plan is to raise the standards of coal merchandizing all over the country, it is imperative that every individual operating under the plan comply with the general over-all merchandizing policies required by the national plan.

"It is high time," said Mr. Reed, "to remove all barbed wire entanglements between

(Continued on page 198)

NEW LOCOMOTIVES

JOIN THE PENNSYLVANIA FLEET



AMERICA'S NEWEST TYPE LOCOMOTIVE—DIRECT DRIVE STEAM TURBINE. First of its kind, embodying many desirable features —among them extra smoothness in power flow.

COAL-BURNING STEAM FREIGHT LOCOMOTIVE (4 cylinders). So ...rful it can pull 125 loaded freight cars at better than 50 miles an hour.

NEW COAL-BURNING STEAM LOCOMOTIVE (4 cylinders) for both passenger and freight service. Now on the railroad's fastest passenger trains.

Within the past year the Pennsylvania Railroad has introduced three new and advanced types of locomotives—one so unprecedented in the science of railroading as to command the headlines of the country. All three types, like thousands of other Pennsylvania locomotives in service, depend for their power on . . . *coal.*

PENNSYLVANIA RAILROAD

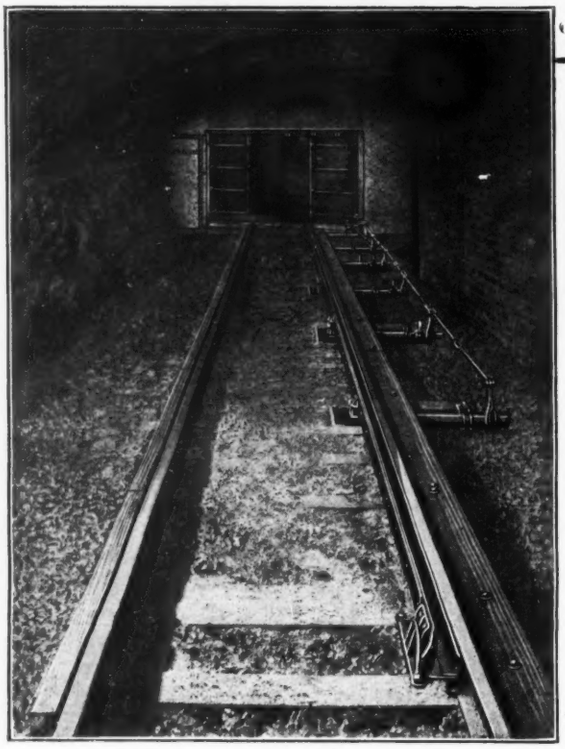
1846 1946

ONE HUNDRED YEARS OF TRANSPORTATION PROGRESS

FOR SAFE, COST-CUTTING MINE OPERATION

AMERICAN MINE DOOR

Economical, Automatic Safety Devices!

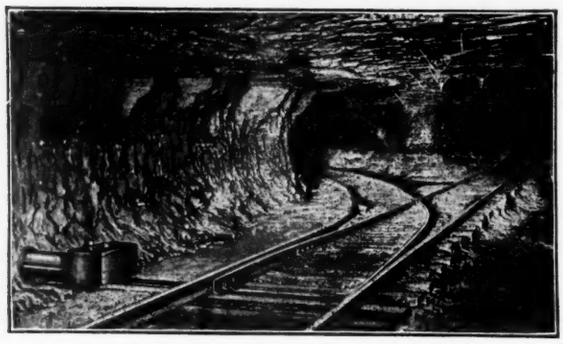


CANTON AUTOMATIC MINE DOORS

These automatic doors operate under heavy pressures —require no attendant—open and close quickly. They are arranged so that one door opens each way, equalizing air pressure and flow. Construction is rigid but weight is kept at a minimum. We can supply CANTON AUTOMATIC DOORS in types to meet every mine condition.

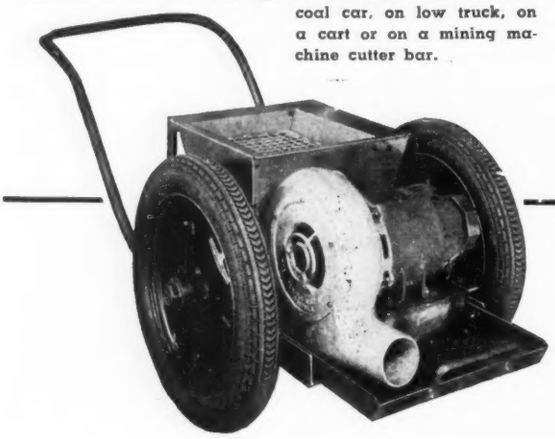
CANTON AUTOMATIC SWITCH THROWERS

. . . does an expert switchman's job and does it faster with complete safety. Automatically throws switch points ahead or behind trip—or both. Trip can maintain full speed. Switch can be operated by remote control, by the motorman or by hand and is adapted for use with our automatic derailer.



THE MIGHTY MIDGET . . . PORTABLE . . . DOES A WHALE OF JOB

A powerful rock-duster, equipped with hose nozzle and sufficient cable to reach remote areas. In actual test it distributed more than a ton of dust per hour during an entire shift. It can be dragged, belt-transported, carried in coal car, on low truck, on a cart or on a mining machine cutter bar.



Send for descriptive catalog

AMERICAN MINE DOOR COMPANY

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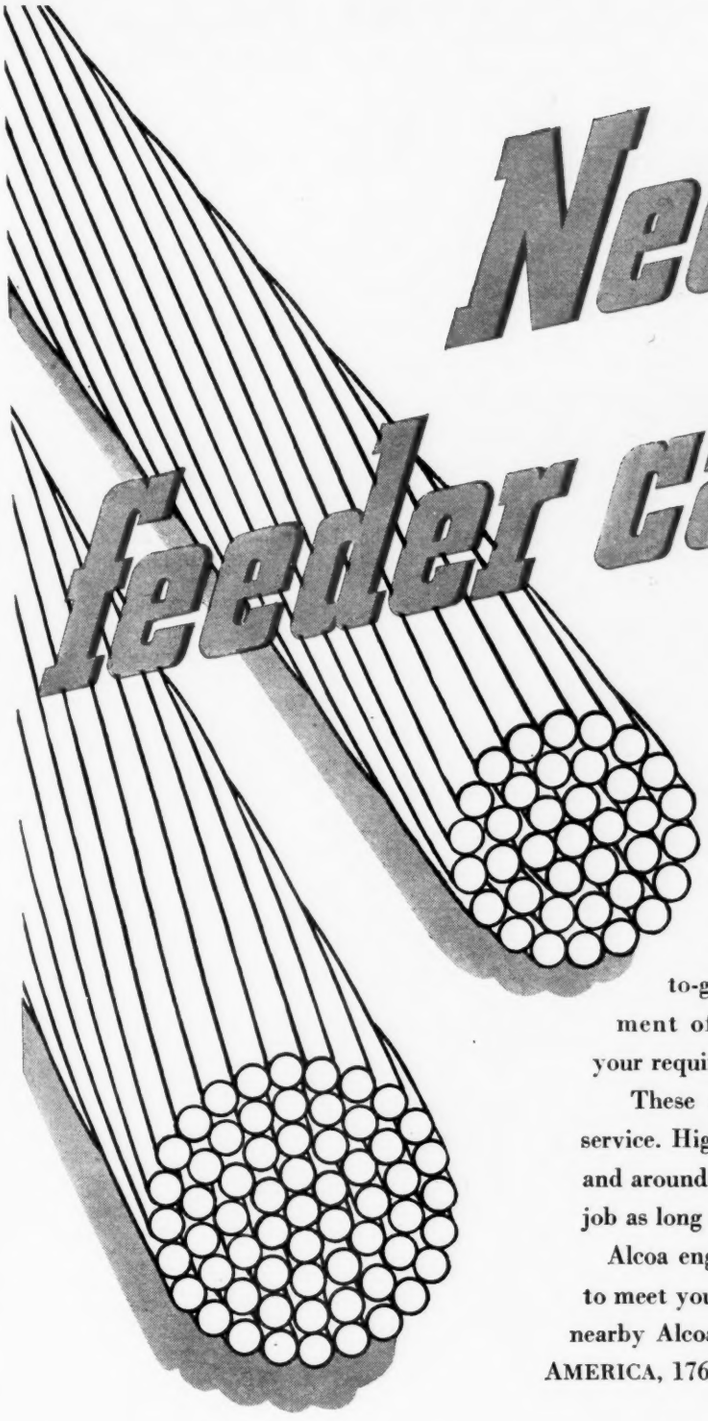
2057 DEUBER AVE.

CANTON 6, OHIO



Need feeder cables?

For quick delivery get

ALCOA ALL-ALUMINUM CABLE, BARE

Install that feeder *now.* No need to hold up important construction waiting for hard-to-get conductors. Alcoa can make prompt shipment of bare, all-aluminum cable in sizes to suit your requirements.

These conductors have proved their worth in mine service. Highly resistant to acid corrosion encountered in and around coal mines, all-aluminum cable has been on the job as long as thirty-five years. And it's still going strong.

Alcoa engineers can help you select all-aluminum cable to meet your needs. For this service, get in touch with the nearby Alcoa office. Or write ALUMINUM COMPANY OF AMERICA, 1763 Gulf Building, Pittsburgh 19, Pennsylvania.

✻ **Typical Example**

795,000 cm. aluminum is equivalent to 500,000 cm. copper. It weighs only 746 pounds per 1000'. Tensile strength 15,300 pounds. Diameter 1.026".

Alcoa does not manufacture insulated cable, but can have the insulation applied for you if that is required and if you can allow the extra time.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

CONGRATULATIONS

to Winners of

"COAL-FOR-VICTORY" AWARDS

Bituminous congratulates the operators and mine-workers of those mines which recently received the COAL AGE "Coal - for - Victory" Awards for 1944-45.

Nearly every state in which Bituminous Workmen's Compensation is written had at least one Bituminous-insured mine on the list of winners. These were:

ALDRIDGE SHAFT (Stith Coal Co.), America, Ala. • BUNKER HILL (Bunker Hill Coal & Mining Co.), Collinsville, Ill. • FREEMAN NO. 1. (Freeman Coal Mining Corp.), Herrin, Ill. • CENTRAL CLEANING PLANT, MINES NOS. 15 AND 18 (The Pittsburg & Midway Coal Mining Co.), Scammon, Kan. • DAWSON COLLIERIES (Dawson Collieries, Inc.), Dawson Springs, Ky. • ELCOMB MINE (Elcomb Coal Co.), Harlan, Ky. • SENTRY MINE (Sentry Coal Mining Co.), Madisonville, Ky. • BLUE VALLEY (Smith & Stokes Mining Co.), Madisonville, Ky. • GREAT VALLEY MINE (Great Valley Anthracite Coal Corp.), McCoy, Va. •

Bituminous is proud of the part its staff of Safety Engineers played in helping these mines maintain exceptional safety records so that top production and efficiency could be achieved.

Security with service

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND ILLINOIS

ASSETS OVER $14,000,000

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

coal producers and retail coal merchants, and Coal Heating Service offers the urgently needed means of removing all semblance of working at cross purposes."

•

Mine Fatality Rate Drops in February

Accidents at coal mines in the United States caused the death of 55 bituminous and 19 anthracite miners in February 1946, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 49,960,000 net tons, the bituminous fatality rate was 1.10 per million tons, compared with 1.63 in January and a similar preliminary rate of 1.22 per million tons for February a year ago, which was later revised to 1.37.

The anthracite fatality rate from accidents in February 1946, in mining 4,781,000 net tons, was 3.97 per million tons, an increase over the January rate of 2.97, and more than double that of 1.36 per million tons for February 1945, which was later revised to 1.80.

For the two industries combined, the February fatality rate was 1.35 per million tons, compared with 1.74 in the preceding month, and the preliminary rate of 1.23 for February 1945, later revised to 1.41.

February 1946 fatalities, by causes and states, and comparable rates for the first two months of 1945 and 1946, were as follows:

SFA to Continue Throughout Year

The Solid Fuels Administration is to remain in existence and continue present operations probably until at least the end of the year, and perhaps longer, according to an announcement by OWMR Chief Snyder. This is line with a recent statement by J. A. Krug, Secretary of the Interior and Solid Fuels Administrator, that he would undertake to continue the SFA "as long as necessary." Disbanding of the SFA at the end of April had previously been announced.

•

Operators Sued For Cave-In Damages

The borough and school district of Shenandoah, Pa., April 9, filed suit for $1,200,000 against the Stephen Girard Estate, owners of the Kehley Run Colliery, for damages they said resulted from cave-ins caused by mining operations underneath the Schuylkill County town, which are said to have affected an area of 16 blocks on Mar. 4, 1940.

Following close on this action, the Pittston School Board on April 9 instructed its solicitor to bring suit against the Pennsylvania Coal Co. for $500,000 damages allegedly caused its high school by mine settlings.

U. S. COAL-MINE FATALITIES IN FEBRUARY 1946, BY CAUSES AND STATES

State	Underground: Falls of Roof	Haulage	Explosives	Electricity	Machinery	Other Causes	Total Underground	Shaft	Open-cut	Surface	Grand Total
Alabama	3	..	..	..	..	..	3	..	..	..	3
Arkansas	..	..	..	..	..	..	..	..	..	1	1
Colorado	1	..	..	..	..	..	1	..	..	..	1
Illinois	5	1	..	..	..	..	6	..	..	..	6
Iowa	..	1	..	..	..	..	1	..	..	..	1
Kentucky	6	1	..	..	..	..	7	..	1	1	9
Maryland	1	..	..	..	..	..	1	..	..	..	1
Montana	1	1	..	..	..	..	2	..	..	..	2
Penna. (bituminous)	7	1	..	..	1	..	9	..	..	1	10
Virginia	2	1	..	..	..	..	3	..	..	..	3
West Virginia	7	7	..	..	..	..	14	1	..	1	16
Wyoming	2	..	..	..	..	..	2	..	..	..	2
Total bituminous	35	13	..	..	1	..	49	1	1	4	55
Penna. (anthracite)	9	3	1	1	..	2	16	..	2	1	19
Grand total	44	16	1	1	1	2	65	1	3	5	74

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS*

January — February, 1945 and 1946

Cause	Bituminous: Number Killed 1946	1945	Killed per Million Short Tons 1946	1945	Anthracite: Number Killed 1946	1945	Killed per Million Short Tons 1946	1945	Total: Number Killed 1946	1945	Killed per Million Short Tons 1946	1945
Underground:												
Falls of roof and face	77	69	0.740	0.684	17	14	1.741	1.620	94	83	0.826	0.758
Haulage	32	39	.308	.386	7	2	.717	.231	39	41	.343	.374
Gas or dust explosions:												
Local	....	5	....	.050	....	....	....	....	....	5	....	.046
Major	15	9	.144	.089	....	....	....	....	15	9	.132	.082
Explosives	1	6	.010	.059	1	1	.102	.116	2	7	.017	.064
Electricity	4	3	.038	.030	1	....	.102	....	5	3	.044	.027
Machinery	2	10	.019	.099	....	....	....	....	2	10	.017	.091
Shaft	1	1	.010	.010	....	....	....	....	1	1	.009	.009
Miscellaneous	4	....	.038	....	6	1	.615	.116	10	1	.088	.009
Total underground	136	142	1.307	1.407	32	18	3.277	2.083	168	160	1.476	1.460
Stripping or open-cut	2	4	.019	.040	2	....	.205	....	4	4	.035	.037
Surface	8	10	.077	.099	4	4	.410	.463	12	14	.105	.128
Grand total	146	156	1.403	1.546	38	22	3.892	2.546	184	178	1.616	1.625

* All figures are subject to revision.

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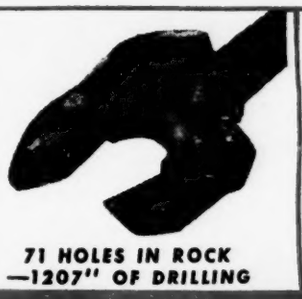
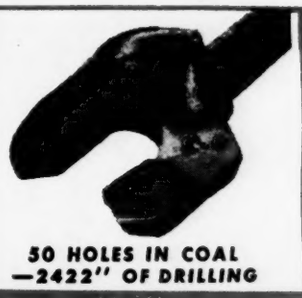
2080" OF HOLE IN COAL



71 HOLES IN ROCK —1207" OF DRILLING



50 HOLES IN COAL —2422" OF DRILLING

209'1" OF HOLE IN ROCK

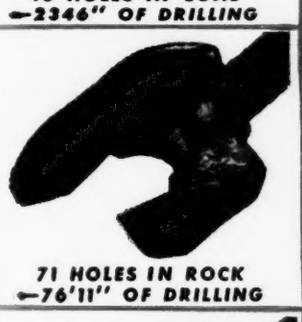
46 HOLES IN COAL —2346" OF DRILLING

KENNAMETAL

ROTARY BITS

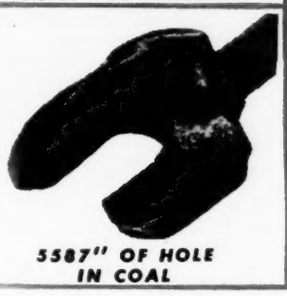
REDUCE DRILLING COSTS 1/3 to 1/2

10,200" OF HOLE IN COAL



71 HOLES IN ROCK —76'11" OF DRILLING

71 HOLES IN ROCK —923" OF DRILLING



5587" OF HOLE IN COAL

209'11" OF HOLE IN ROCK

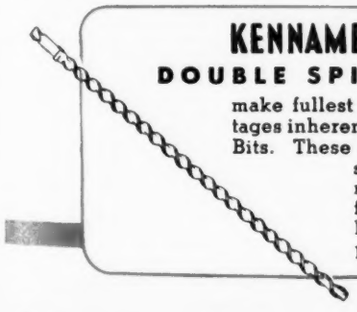
275'5" OF HOLE IN ROCK

1488" OF HOLE IN COAL

THE Kennametal Bits shown drilled the footages noted *before being resharpened.* Many of them still do not need regrinding. All can be reground many times. Thus, total footage ultimately drilled with each bit is a score or more times the figure given. In fact, service results show that a single Kennametal Bit has drilled more than 30,000 feet of hole in coal—*equivalent to approximately 9,000 holes, forty inches deep.*

Kennametal Bits are entirely unlike any other drill head available. The brazed-in cutting tips are tough, hard Kennametal; the body is a *one-piece* alloy steel drop forging, heat-treated; the design is such that gage is continuously maintained. There are no wedges or screws to come loose and delay operations; no need to over-drill to compensate for bit wear; no danger of blow-outs due to hole taper.

Kennametal Drill Bits keep skilled men on the job drilling holes instead of changing bits; permit effective drilling in roof and floor shale; lessen wear and tear on drilling machines; reduce power consumption—actually have demonstrated that they may save up to 50% of drilling costs. *Want more information?* Write, giving details of your operations.



KENNAMETAL

DOUBLE SPIRAL AUGERS

make fullest utilization of advantages inherent in Kennametal Drill Bits. These augers are double-spiral, solid-center rolled shapes, made of forged alloy steel, heat-treated. Write for particulars.

TRADE MARK REG. U. S. PAT. OFF.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

WORKING HIGH UP WHERE THERE'S

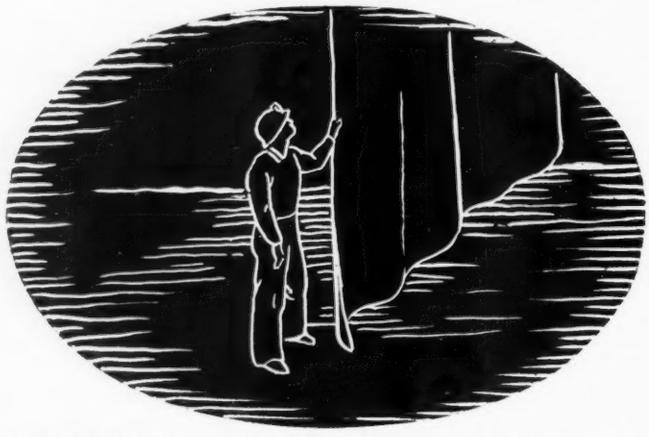
Fresh Air

. . . even though working way down your men have fresh air when you use . . . . . .

ABC

JUTE BRATTICE CLOTH

ABC Jute Brattice Cloth is specially treated to resist corrosive conditions and to reduce air friction—four grades from which to choose to properly fill your needs give POSITIVE ASSURANCE against such destructive forces as flames and fungi. Also, even though your mine has unusual moisture, it will not cause shrinkage of ABC Jute. Our many years of experience is at your disposal. Investigate ABC Jute Brattice Cloth now when dependability of performance in all equipment is so very important.



AMERICAN BRATTICE CLOTH CO.

WARSAW INDIANA

Mining Machine Model Displayed At Meeting

Approximately 100 persons attending the regular monthly meeting of the Central West Virginia Coal Mining Institute at the Waldo Hotel, Clarksburg, April 12, saw a model of a coal cutter and loader which the inventor, Clarence E. Brown, Clarksburg, believes may revolutionize the coal industry.

Mr. Brown told the Institute that his machine could eliminate the physical dangers and improve the quality and volume of coal produced by any mine. It is estimated the machine will cut and load over 3,000 tons of coal per shift in the Pittsburgh seam. Mr. Brown is an employe of the Dawson Coal Co., Clarksburg, W. Va.

•

Obituary

THOMAS LIPPEATT SR., 78, president and general manager of the Dugger Domestic Coal Co., Sullivan, Ind., died in April.

CARL A. JENNE, 54, mine manager for the Louisville Gas & Electric Co. and associated with the company for more than 30 years, died April 12 at the Kentucky Baptist Hospital, Louisville, after an illness of six weeks.

ROBERT Z. VIRGIN, 73, assistant director of the mining extension department of West Virginia University, assistant professor of coal mining for Carnegie Institute of Technology and consultant for several mining companies, died last month in Wheeling.

H. H. COIL, president of the Coil Coal & Mining Co., died March 28 at a Nashville hospital.

G. DOAK DAVIDSON, 57, partner in the D. B. J. Colliery Co., Pikeville, Ky., was instantly killed April 10 while supervising construction work at the mine. He was formerly superintendent and general manager for the Harman Coal Co., Pikeville, Ky.

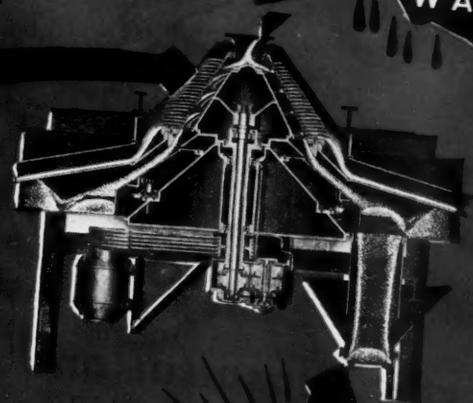
FLOYD CHANCY, 47, owner and operator of the Black Banner Coal Co., Marion, Ill., died April 10 at the Holden Hospital in Carbondale.

LUTHER E. WOODS SR., 63, president of the Crystal Block Coal & Coke Co., Huntington, W. Va., and former West Virginia State senator, died suddenly April 9 in Washington while conferring with his attorney. He had arrived in Washington the previous day to take part in the bituminous wage conference as chairman of the Bituminous Coal Producers' Advisory Board of District 8. He had been president of the Operators' Association of the Williamson Field for 20 years, and was active in many civic and mining organizations.

ARTHUR H. LEWIS, 72, mining engineer, associated with the Glen Alden Coal Co. for 28 years until his retirement in January 1945, died last month in the Wilkes-Barre General Hospital.

"C-M-I" *Continuous Centrifugal* DRYER

USED IN THE MOST MODERN CLEANING PLANTS



LOWEST SURFACE MOISTURE *at less cost per ton!*

Some of these "C-M-1s" are being used for de-watering the minus ¼" or ⅜" sizes while others are used for reclaiming the minus 10 mesh particles.

No matter whether the top feed size is ⅜" or is 10 mesh, the product from the "C-M-1" contains less surface moisture than can be obtained from any other type of mechanical dewatering and all at a very few cents per ton.

USE THE "C-M-I" CONTINUOUS CENTRIFUGAL

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.

146 PRESIDENT ST., ST. LOUIS 18, MO.

Friends, Cards, Flowers and Telegrams *are nice when your men are ill—*

but they need money to pay Doctor, Hospital and Funeral Bills

Accidental injury or sickness usually requires cash which most workers do not have available. The result is debt and worry for your employee—and slowed-up production for you.

The Protective Plan of Hospital, Surgery and Death Benefits for the employee and his family will relieve this kind of trouble for your men and for you. Each employee pays the moderate cost through your own payroll deductions. It costs your company nothing—all you need to do is give your permission to put the Plan into operation.

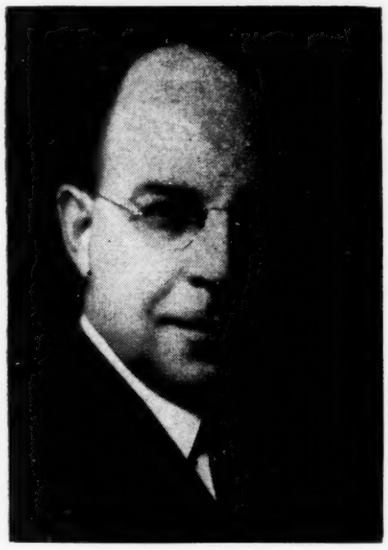
The Protective Plan is now in successful operation in many of the largest plants and factories throughout the South. A Protective Life representative will explain details to you without obligation. Write us for an appointment.

PROTECTIVE LIFE
INSURANCE COMPANY

WILLIAM J. RUSHTON
President
BIRMINGHAM
ALABAMA

Personal Notes

DR. LOUIS C. MCCABE, an authority on the mining, preparation and properties of coal, joined the U. S. Bureau of Mines staff on April 5 as chief of the Coal Division in the Fuels and Explosives Branch, it has been announced by Dr. R. R. Sayers, director. Dr. McCabe will supervise the bureau's research on the mining, preparation, carbonization,



Dr. Louis C. McCabe

and gasification of coal and kindred subjects at the bureau's experiment stations and pilot plants in various parts of the country. Formerly a member of the staff of the coal division of the Illinois Geological Survey, Dr. McCabe performed outstanding service in fuels and heating, refrigeration, and power supply for the armed forces during his four-year tour of duty, and during the last months of the war in Europe he was on Gen. Eisenhower's staff as chief of the Solid Fuels Section of the United States Forces, European Theater. He was released from the army with rank of Colonel.

GLENN BEARDEN, formerly superintendent of the Kingston Pocahontas Coal Co. mines at Hemphill, W. Va., has been named superintendent of the Peerless Coal & Coke Co. mines at Vivian, W. Va.

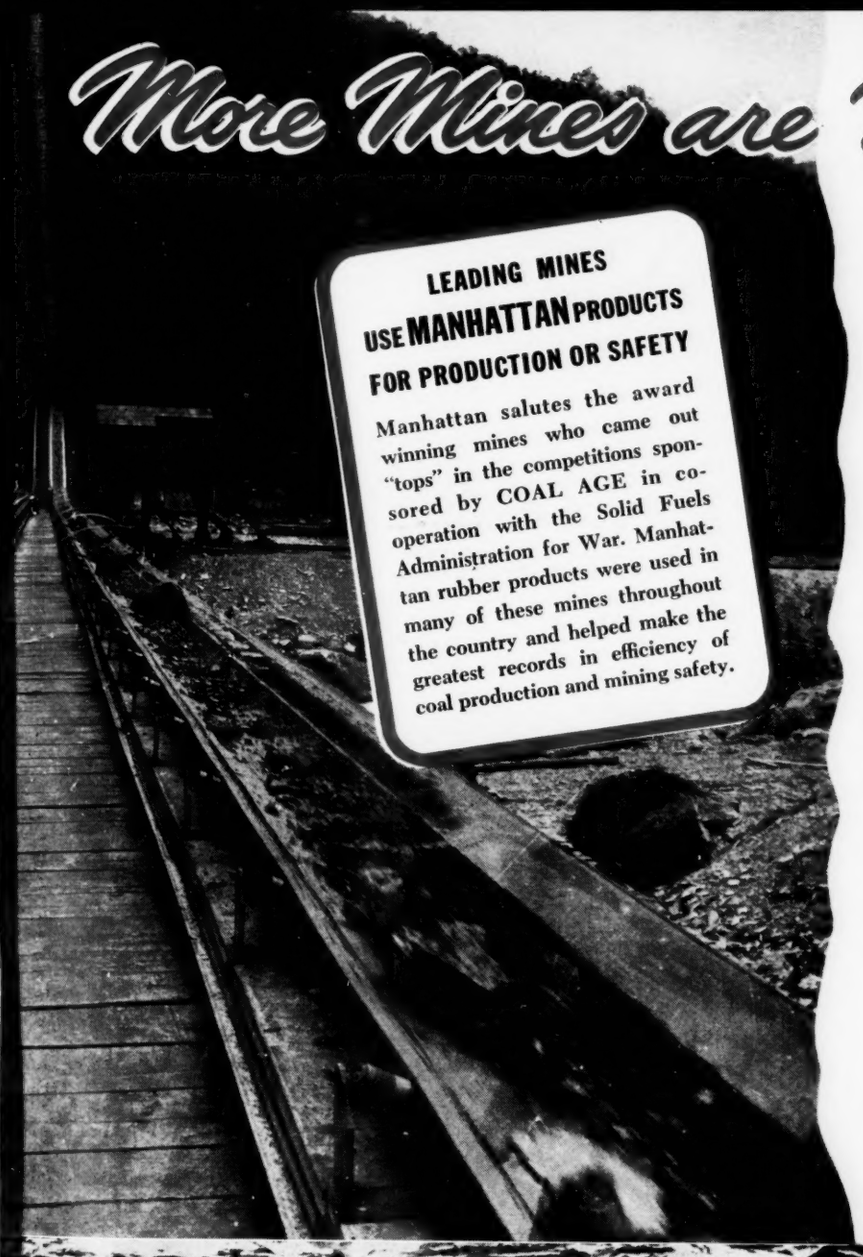
ELMER S. MAYOR, formerly assistant superintendent for the Pyramid Coal Co., Pinckneyville, Ill., has been advanced to the post of superintendent in charge of all production in Indiana, Illinois, Missouri and Arkansas for the Binkley Coal Co. ARTHUR F. LEE, for eight years chief civil engineer for the Pyrimid interests in Perry County, Illinois, has been made engineer in chief for Pyramid properties in the four above-named states.

C. N. STRONG, formerly assistant director of purchases for the Island Creek Coal Co., Huntington, V. Va., has become purchasing and commercial agent for the Corporation De Fomento, New York, representing the government of Chile. Previous to his connection with Island Creek, Mr. Strong was engineer for the United Electric Coal Co.

The Philadelphia & Reading Coal & Iron

(*Continued on page 206*)

More Mines are Mechanizing with MANHATTAN CONVEYOR BELTS



LEADING MINES USE MANHATTAN PRODUCTS FOR PRODUCTION OR SAFETY

Manhattan salutes the award winning mines who came out "tops" in the competitions sponsored by COAL AGE in cooperation with the Solid Fuels Administration for War. Manhattan rubber products were used in many of these mines throughout the country and helped make the greatest records in efficiency of coal production and mining safety.

New mine conveyors are reaching further and further into the bowels of the earth to bring out more coal to feed the furnaces of American Industry. Manhattan Conveyor Belts are going on more and more new underground conveyor systems and worn belts are being replaced by Manhattan belts. Some mines are equipped 100% with thousands of feet of Manhattan Conveyor Belting. Manhattan has ample service data showing record tonnages and more months of service with properly recommended Manhattan belts. It's the engineering of STRENGTH MEMBERS and FLEXLASTICS that makes the difference.

When improving the mechanization of your mine operations, consider MANHATTAN Conveyor Belts, especially Homocord Belt, with cushioned, cord structure and troughing advantages.

FLEXLASTICS is an exclusive Manhattan trade mark. Only Manhattan can make FLEXLASTICS.

MANHATTAN Condor PRODUCTS FOR MINES

Conveyor and Elevator Belts
Transmission Belts
V-Belts
Air, Water, Steam Hose
Fire Hose
Dusting Hose
Suction Hose
Oil Spray Hose
Flexible Rubber Pipe
Rubber-Lined Pipe
Chute and Launder Lining
Packing and Gaskets
Vibration Dampeners
Mine Trolley Wire Guard
Reel Flanges
Brake Blocks and Lining
Molded Mine Specialties
Abrasive Wheels

RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION

EXECUTIVE OFFICES AND FACTORIES PASSAIC, NEW JERSEY

COAL for VICTORY HONORS

go to users of

TRANSITE PIPE

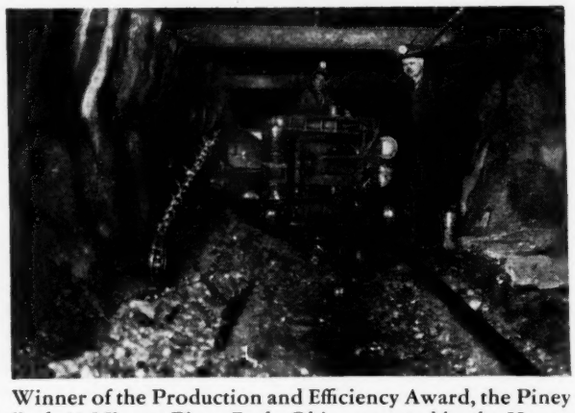
AMONG the prize-winning workings for 1944 and 1945 are the three mines pictured at the right—all users of Johns-Manville Transite Pipe.

Leading producers in many fields use this modern asbestos-cement pipe because of its high resistance to corrosive mine water. Over the years, Transite Pipe has established many records for long life and economy in mine drainage service, enabling mine owners to measure the life of their pipe in years rather than months!

In addition to its ability to resist corrosion, Transite Pipe is light in weight—easily installed. It is readily salvageable—two of the three winners are still using Transite Pipe which was originally installed years ago in other mines. The Simplex Couplings form tight joints that deflect as much as 5° at each coupling (pipe may be laid around curves without special fittings). Two men can easily assemble Transite Pipe in the sizes generally used, even in restricted mine passages.

For complete information on Transite Pipe for mine drainage, water supply and other services, write Johns-Manville, Box 290, New York 16, N. Y.

Winner of the Production and Efficiency Award, the Pursglove #15 Mine is operated by the Pursglove Coal Mining Co., users of Transite Pipe since 1936. The first installation in the present working (2,300 ft. laid in 1943) resisted the highly corrosive water so well that over 3,000 ft. were added. Now over a mile of Transite is in use.



Winner of the Production and Efficiency Award, the Piney Fork #1 Mine at Piney Fork, Ohio, operated by the Hanna Coal Co., cut a trench in solid rock for their first installation of Transite Pipe in 1937. Because it resisted the corrosive effect of sulphurous slag, Transite Pipe was also selected for a 1900 ft. pressure line to a washery in 1941.

Winner of the Production Award, the Willow Grove #10 at St. Clairsville, Ohio, is also owned by the Hanna Coal Co. This large modern mine now uses Transite Pipe for drainage totaling 4,300 ft., of which 800 ft. of 3" and 500 ft. of 2½" pipe was recovered from lines laid in 1937 and 1938 . . . proving Transite's salvageability as well as long service in corrosive surroundings.

Johns-Manville TRANSITE PIPE FOR COAL MINE SERVICE

Apex Powder buys two more

McCarthy Rock Boring Machines

Finger-tip control

Hydraulic feed

Set to any level

Apex Powder & Supply Co., Canton, Ohio, specializes in strip drilling in coal fields of eastern Ohio, western Pennsylvania and northern West Virginia. Their operators can handle any type of rock, shale, earth or mud drilling, long or short holes, small or large diameter.

Introduced less than two years ago, the McCarthy Rock-Boring Machine for horizontal drilling has been a sensation.

Apex Powder & Supply Co., Canton, Ohio, bought the first McCarthy. Based on drilling performance, "Bill" Matthews, Manager, has installed two more, the most recent one shown here.

Matthews, in his diversified drilling experience, has used many drilling machines, including a few of his own design. He has chosen the McCarthy for several good reasons, the most important one—his operators can drill more holes per day.

Actual drilling operations show the McCarthy delivers 40% more holes every day. Here's one actual operating figure . . . 16 80-foot holes in one working day.

If you will furnish details on your drilling depths, etc., we will show you what the McCarthy will do in your strip pit. Then you can judge for yourself whether you can make money with a McCarthy.

40% MORE HOLES PER DAY

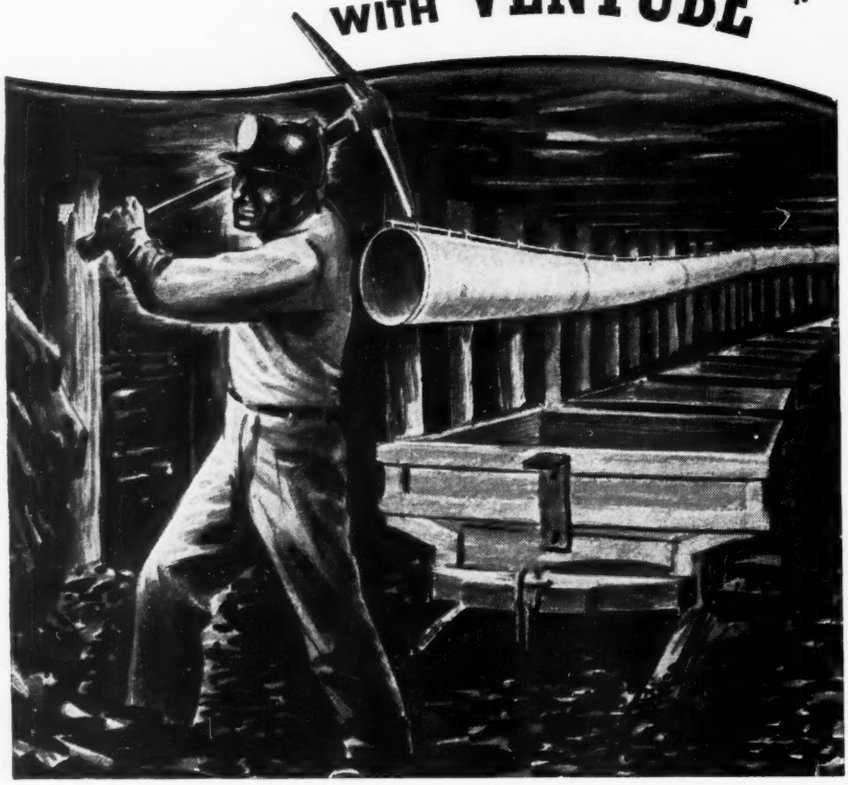
- Hydraulic feed plus finger-tip control.
- New type jack raises machine as much as 4' from truck bed.
- Compact and rugged.
- Requires only narrow space yet weighs twice as much (3500 pounds) as other machines.
- Will handle 7' augers readily.
- Easily moved from job to job.
- Designed by a Strip Mine Driller who knows from experience what operators want in drilling machines.

SALEM TOOL CO. SALEM OHIO

Drilling and earth boring specialists. Manufacture all types of augers from 1¼" to 8" Dia. and distribute complete line of mining tools and supplies.

YOU CAN GET

MORE OUTPUT PER MAN WITH "VENTUBE"*



Healthier working conditions mean stepped-up efficiency—each man gets more work done! That's why countless mine owners find that it pays to efficiently bring fresh air right up to the working face with Du Pont's flexible, synthetic-rubberized ventilating duct attached to a motor-driven fan of adequate air capacity. Operators choose "Ventube" for these outstanding advantages:

"VENTUBE" costs less to install than rigid ventilating systems. One man can carry 100 feet.

"VENTUBE" is flexible. It bends around corners, takes up less space in openings. Suspended on wire, it can't get in the way of men at work.

"VENTUBE" clears dust quickly. It reduces the time your men must be idle waiting after blasting. And "Ventube" is quickly extended as the face advances.

"VENTUBE" is compact. Your men can easily pack and store "Ventube" for installation elsewhere.

For safety and efficiency, operators observe all local mine regulations governing the installation and use of "Ventube." The blower must have a permissible motor and adequate air capacity. The area should be checked for gases before the blower is turned on. If power fails, turn off the blower switch. Then the blower can't go on automatically before the area is checked.

For further "Ventube" details, or consultation with Du Pont Technical Service, just write E. I. du Pont de Nemours & Co. (Inc.), Fabrics Div., Fairfield, Conn.

*"VENTUBE" is Du Pont's registered trade mark for its flexible, synthetic-rubberized ventilating duct.

DU PONT "VENTUBE"

REDUCING COSTS THROUGH BETTER VENTILATION

DU PONT

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

Co. has announced the following changes in engineering personnel:

GEORGE J. CLARK, formerly division engineer of the Pottsville division, has become chief engineer of the Shen-Penn Production Co. ELMER F. YOUNG, who has been division engineer in the Mahanoy division, has been appointed to succeed Mr. Clark. F. J. MEYER, assistant division engineer, Mahanoy division, will succeed Mr. Young. H. D. ARTZ, colliery engineer at Maple Hill colliery, has been named assistant division engineer, succeeding Mr. Meyer. W. J. MYER, colliery engineer at Knickerbocker colliery, has been named colliery engineer at Maple Hill colliery, and GEORGE H. SNYDER becomes colliery engineer at Knickerbocker colliery.

ROBERT P. MILLER, formerly an engineer with the Wright Aeronautical Corp., Paterson, N. J., has joined the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he will be engaged in research in fuels technology.

WILLIAM S. MAJOR of Philadelphia, Pa., has been appointed development engineer for the Bituminous Coal Research, Inc., Pittsburgh, according to announcement by Dr. Harold J. Rose, vice president and director of research. Well known in the power field after 20 years of service with American Engineering Co., manufacturers of industrial stokers, Mr. Major will be responsible for promoting various BCR research projects that have progressed far enough to justify commercial trial or use. He will deal at first largely with industrial and commercial equipment designed to provide improved utilization of bituminous coal, and will promote wider use of BCR-designed overfire jets as smoke-prevention devices, especially in the stationary field. He will also be concerned with development of large-scale equipment utilizing bituminous coal, and with research projects designed to develop compact automatic coal-fired industrial boilers.

WILLIAM STAPLETON has been promoted from mine foreman to superintendent, Mines No. 206, 206-B and 207, Consolidation Coal Co., Dunhan, Ky. Starting with Consolidation 14 years ago as a loader, he has served in many different capacities.

CARL WALKER, formerly superintendent of the Clinton mine of the Ayrshire Collieries Corp., has been named superintendent of the company's Chinook mine at Staunton, Ind., succeeding W. A. ENDICOTT who has been transferred to head the company's new operation at Danville, Ill.

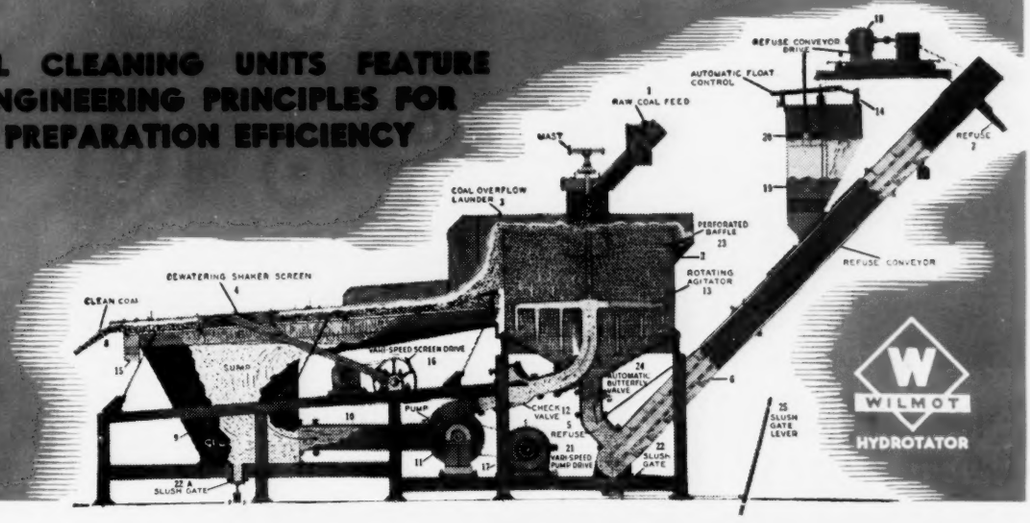
J. M. TULLY, formerly superintendent, has been elected president of the Crystal Block Coal & Coke Co., Huntington, W. Va., to succeed the late Luther E. Woods. Mr. Tully will also head a company affiliate, the Crystal Block Coal Mining Co.

C. FRED HEUNE, associate editor of the *Scranton Times* for the past 12 years, has been employed by Anthracite Industries to work with producing companies on general labor and labor relation problems, according to an announcement by Major W. W. Inglis, president, Glen Alden Coal Co.

CARL S. WESTERBERG has joined the Pittsburgh staff of the Bituminous Coal Research Inc. He was formerly associated with the Utah Fuel Co. and the Illinois

EFFICIENCY

WILMOT COAL CLEANING UNITS FEATURE EXCLUSIVE ENGINEERING PRINCIPLES FOR MAXIMUM PREPARATION EFFICIENCY

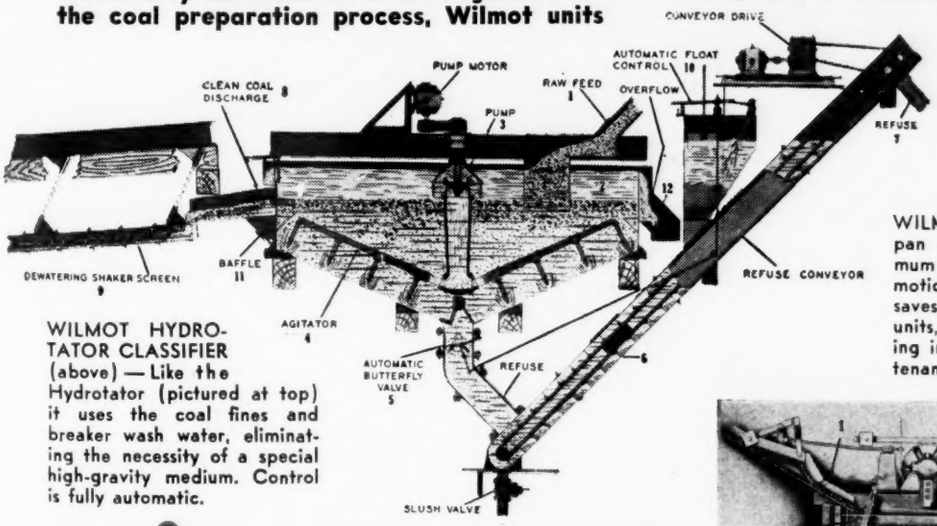


NOTHING pleases an efficiency-minded production man more than his discovery of a new automatic control. That goes without saying. And that's why the recent announcement of the incorporation of added automatic controls in Wilmot coal cleaning equipment has been received as real news.

Long recognized for the greater ease with which they maintain accurate regulation of the coal preparation process, Wilmot units now afford a new high in automatic control, as a result of the recently developed engineering features.

Traceable directly to the increased efficiency resulting from the incorporation of these new controls are: greater ease of maintaining standards of quality; minimum loss of coal in refuse; reduced operating costs; and, of course, simplified operation.

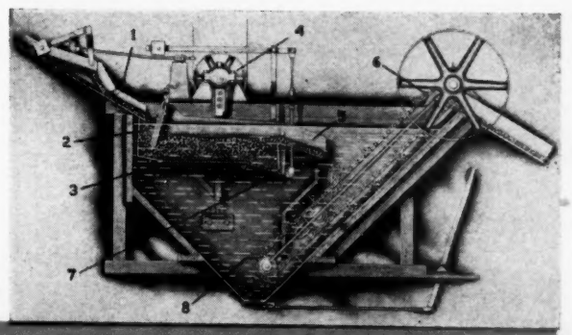
Engineering bulletins are available on all Wilmot products. They merit a ready place in your reference files.



WILMOT HYDROTATOR CLASSIFIER (above) — Like the Hydrotator (pictured at top) it uses the coal fines and breaker wash water, eliminating the necessity of a special high-gravity medium. Control is fully automatic.

★

WILMOT SIMPLEX JIG (below)—O' pan or basket type, requiring minimum of water. Forward horizontal motion increases capacity. Shorter; saves floor space. Like all Wilmot units, they feature simplicity, resulting in minimum operating and maintenance costs.

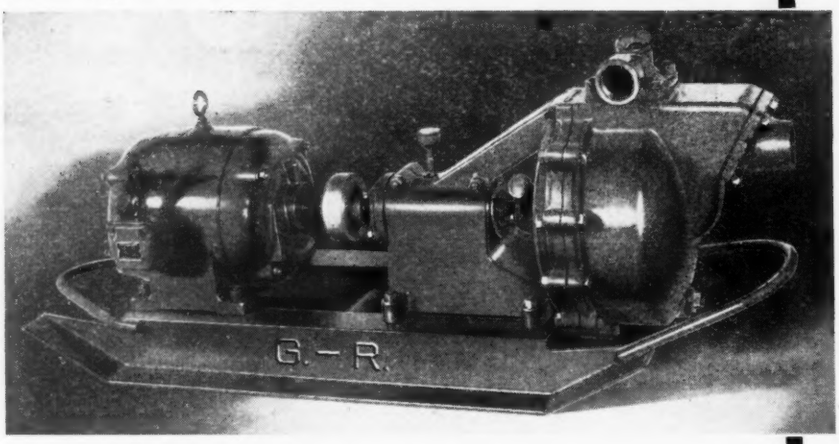


Other Wilmot Coal Preparation Equipment: Hydro-Separators, Portable Cleaners, Crushing Rolls, Sizing Shakers, Bucket Elevators, Conveyors, Car Hauls, Keystone Rivetless Chain, etc.

WILMOT ENGINEERING CO.

HAZLETON, PA.
Foundry and Shops:
WHITE HAVEN, PA.

THIS GORMAN-RUPP PUMP REQUIRES NO ATTENTION



--IDEAL FOR REMOTE OR AUTOMATIC CONTROL WHERE RELIABILITY IS DEMANDED.

GORMAN-RUPP gathering pumps seldom need attention. They are completely and automatically self-priming. This action is so powerful that, on test, they have primed perfectly through 200 feet of dry, two-inch suction line. There is no adjustment between prime and run. No change takes place. There are no valves or gadgets to rob pumping efficiency. Gorman-Rupp pumps are the most simple, rugged, trouble-free units you can buy.

You never need to tinker with a Gorman-Rupp pump because of clogging. It will handle muck, sand, or any solids that will pass the intake strainer. These are fully discharged and do not remain in the case to require eventual removal.

The occasional service due to wear from water-born abrasives is done easily by an unskilled workman with common tools. All such wearing parts are readily and easily renewable.

For gathering service where absolute reliability and freedom from attention are essential, your best pump buy is Gorman-Rupp.

For additional information write for bulletin No. MP-2, or contact the nearest distributor listed below.

THE GORMAN-RUPP COMPANY
306 BOWMAN STREET, MANSFIELD, OHIO

Distributed by: The Bittenbender Company, Scranton, Penna. — Hennessy Company, Watertown, Wisc. — Hoe Supply Company, Christopher, Ill. — Industrial Supply Co., Terre Haute, Ind. — Guyan Machinery Co., Logan, W. Va. — Weinman Pump & Supply Co., Pittsburgh, Penna. — Central Supply Co., Greenville, Ky. — Hendrie & Bolthoff Mfg. & Supply Company, Denver, Col. — McComb Supply Company, Harlan, Ky. — Ebbert & Kirkman, Inc., Birmingham, Ala. — John T. Lees, Scranton, Penna. — Ladel Machinery & Conveyor Co., New Philadelphia, Ohio — Union Supply Co., Denver, Col.

Geological Survey, and has been engaged in bituminous-coal activities since 1931.

JOSEPH ZABROSKY SR. has been appointed superintendent for the Beatty Coal Co., Latrobe, Pa.

L. G. SHORTHOUSE, formerly superintendent of the company's Buckheart mine, Canton, Ill., has been named to the newly created post of general superintendent of mines for the United Electric Coal Cos. Other appointments announced by United Electric include that of JOHN J. HUEY, formerly electrical engineer, as chief engineer and T. H. LATIMER as engineer in charge, of coal prospecting and development. "RUSTY" CAMPBELL, formerly pit foreman, has been appointed superintendent of the Buckheart mine and DON SMITH, formerly preparation plant manager, has been named pit foreman, with CARL D. DAY, chief electrician, succeeding him as preparation-plant manager.

R. D. PATTERSON, assistant superintendent, Mine No. 32, Consolidation Coal Co. has been appointed superintendent of Consolidation's Mine No. 98, Nora, W. Va. According to the company's announcement, Mine No. 98 is being completely mechanized and is expected to reach a daily capacity of 2,000 tons. L. H. WINGER has been named maintenance foreman at Mine No. 98. At Mine No. 25, Pinnickinnick, W. Va., BURL G. STEELE has been promoted to section foreman. ROBERT M. ELEYETTE has been promoted to section foreman and SANFORD G. STRAIGHT appointed tipple foreman, third shift, at Mine No. 32, Owings, W. Va.

DAN F. KEMP is to be appointed price executive of the Solid Fuels Price Branch on the departure of JOHN P. BARNES, JR., who has been acting price executive, according to announcement by the OPA.

DONALD JONES, recently discharged from the army, has joined the general engineering department of the Susquehanna Collieries Co., Nanticoke, Pa.

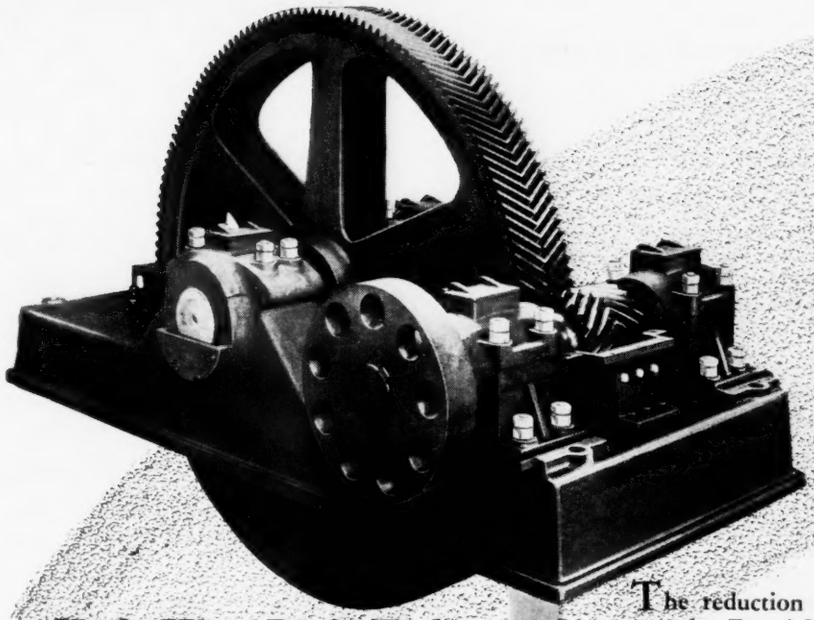
MICHAEL J. FERRELL Jr., released from the army as a captain, has been appointed assistant mining engineer, No. 7 colliery, Susquehanna Collieries Co., Nanticoke, Pa.

JOSEPH P. DOYLE, general superintendent of docks, Pittsburgh Coal Company, since 1918, retired on May 1, GLEN R. HORNKE, assistant to Doyle, has been named as the new general superintendent. Mr. Doyle, 75, is accredited with several patents on machinery facilitating the loading and unloading of coal aboard ships and is widely known throughout the industry.

Association Activities

POCAHONTAS OPERATORS' ASSOCIATION has reelected all its officers as follows: president, O. L. Alexander, president, Pocahontas Fuel Co.; vice president, William Beury, president, Algoma Coal & Coke Co.; treasurer, Henry F. Warden, general manager, American Coal Co. of Allegany County; and secretary, W. E. E. Koepler, Bluefield.

ILLINOIS TRUCK COAL PRODUCERS' ASSOCIATION has recently been chartered in Illinois with offices at 2212 Lowell Ave.,



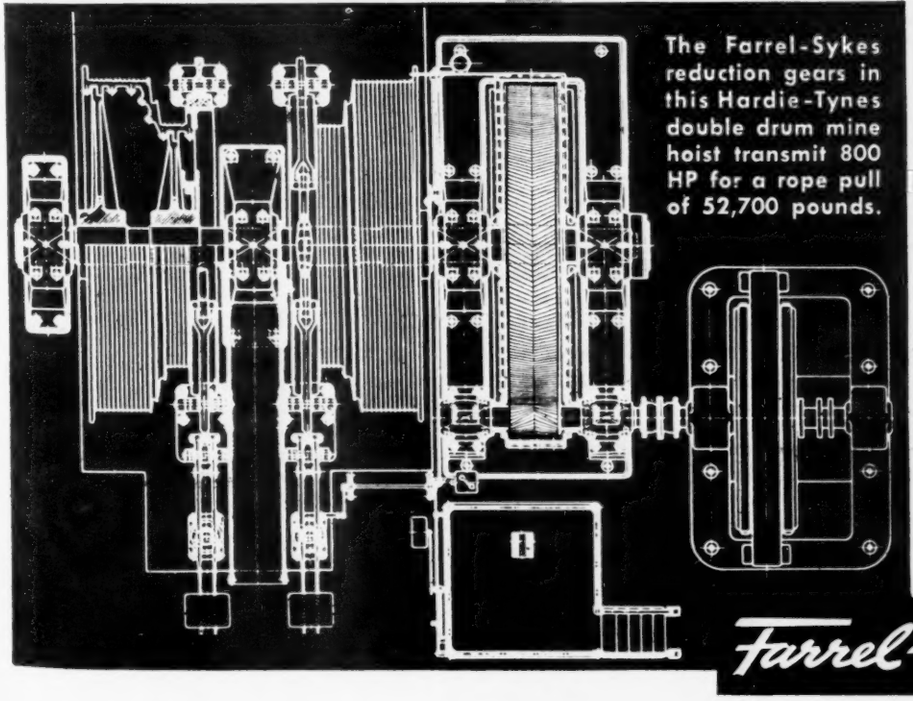
HOW DOES BACKBONE FIT INTO MINE HOIST DESIGN?

The reduction gears in this Hardie-Tynes mine hoist are the Farrel-Sykes continuous tooth herringbone design — the famous *Gear with a Backbone.* Their features of design and precision manufacture assure dependable performance, continuous operating efficiency and maintenance economy.

The *backbone* formed by the juncture of the two helices, without a center groove, puts the entire face to work and provides extra strength and high load-carrying capacity. Precision generation by the Farrel-Sykes process makes these gears exceptionally quiet and smooth running, even at high speeds.

Overlap or interlacing of the teeth, gradual engagement and inclined line of pressure distribute the load on the teeth uniformly, reducing wear and maintaining correct tooth action throughout a long gear life. Opposed helices balance and absorb axial thrust within the gear member, eliminating harmful thrust loads and resultant stresses on other parts of the machine.

For further information on Farrel gears and gear units, send for a copy of descriptive booklet No. 438.



The Farrel-Sykes reduction gears in this Hardie-Tynes double drum mine hoist transmit 800 HP for a rope pull of 52,700 pounds.

Above — A typical Hardie-Tynes mine hoist drive with Farrel-Sykes continuous tooth herringbone reduction gears.

FARREL

The Gear with a Backbone

FARREL-BIRMINGHAM COMPANY, INC.
344 Vulcan Street, Buffalo, N. Y.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles, Tulsa, Houston

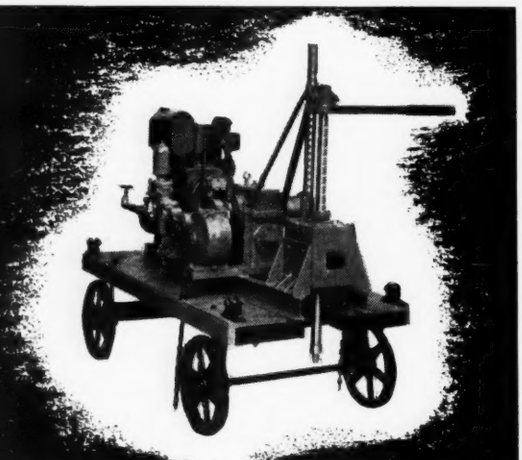
Farrel-Birmingham

ONLY
RUBEROID
Insulating Tape
has all these 7 Features

1 Double grip . . . both sides adhesive.
2 Great tensile strength . . . tough.
3 Won't tear, ravel or pucker.
4 Resists abrasion.
5 Acid- and alkali-proof.
6 Extra thick . . . one layer insulates.
7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

RUBEROID
INSULATING TAPE
The RUBEROID Co., Executive Offices, 500 Fifth Avenue, New York 18, N. Y.

CORE DRILLING FOR COAL



RUGGED PORTABLE CORE DRILLS
Acker Drills are simple to operate and easy to move in rough country.—They can be mounted on a small motor truck—drag—or trailer.
• • •
Determine depths of overburden before strip mining and thickness and quality of coal seams.
• • •
Tools and equipment for all sub-surface exploration.
• • •
Send for literature

ACKER DRILL CO. SCRANTON 3, PA.

Springfield, Ill., to promote business-like methods in negotiating contracts and employee-operator relations and to generally further truck-mine interests. Edward Wenneberg, Bryan Eddy and Glenn E. Town are the incorporators.

American Institute of Mining & Mettalurgical Engineers has appointed Carl Scholz, Charleston, W. Va., as its representative on the Joseph A. Holmes Safety Association. Mr. Scholz has been elected a director of the Holmes association.

Illinois Coal Strippers Association has appointed Louis S. Weber land use engineer.

•

Keystone Coal Manual Available Soon

The 1946 edition of *Keystone Coal Buyers Manual*, containing descriptive data on all coal mines producing 100 tons or more per day, is to be released early in June. Edited especially for the coal purchaser, the *1946 Keystone* also includes special directory sections on "Mechanical Coal Cleaning Plants," "Trade Names" and "Coal Sales Organizations," and a new feature, "A Description of Seams," which includes average of range analyses and an "Index to Operators," by seams.

Hundreds of new mines have been opened in recent years, a greater development of new properties since Pearl Harbor than at any previous period in history. *Keystone*'s editors estimate that over 35% of the nation's coal in 1947 will come from mines developed and opened since 1941. Data on these new mines is of course a feature of *Keystone*.

The 1946 edition can be secured at $10.00 per copy by addressing *Keystone Coal Buyers Manual*, 330 West 42nd Street, New York 18, N. Y.

Preparation Facilities

Page Mining Co., Page, W. Va.—Contract closed with Kanawha Mfg. Co., for head house and conveying system consisting of trip feeder, in-built track scale, power rotary dump, two 200-ton concrete-stave bins with electric vibrating feeders to 1,200-ft.-long inclined belt conveyor for delivery to existing tipple; installation replaces existing monitor plane; capacity, 250 t.p.h.

Johnstown Coal & Coke Co., Logan No. 6 Mine, Beaverdale, Pa.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washing plant with 5x14-ft. vibrating scalping screen ahead of washer, 4x8-ft. horizontal vibrating sizing screen following washer, and raw-coal, refuse and clean-coal conveyors; for 2½x⅜-in. coal; capacity, 60 t.p.h.

Lake Superior Coal Co., No. 3 Mine, Superior, W. Va.—Contract closed with Kanawha Mfg. Co. for mine-rock disposal system, consisting of an electrically operated gate discharging into a storage hopper from which an apron feeder delivers to an inclined belt conveyor; belt conveyor elevates

(Continued on page 215)

Don't leave it to chance

WITH A CARNIVAL WHEEL of 15 numbers, the odds against your winning the coffee pot, kewpie, or cash, are, naturally, 14 to 1. And these 14 to 1 odds are against you at every turn, regardless of how many times your number may have previously failed to win.

LEAVE IT TO— HY-TEST

THE SAFETY SHOE WITH THE ANCHOR FLANGE STEEL BOX TOE

This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting and tilting when toe is struck at an angle.

Bucking the odds at 14 to 1 is far less foolhardy than working on hazardous jobs without the protection of safety shoes. And when workers look for best protection they want the safety shoe with the Anchor-Flange Steel Box Toe—HY-TEST.

Workers never see or feel the Anchor-Flange Steel Toe, but when something drops on the foot, this built-in fortress is johnny-on-the-spot shielding toes from foot-crippling accidents that cost both workers and plant a lot of money. Built on roomy lasts and sturdily constructed for longer wear, Hy-Test Safety Shoes have a winning way with workers. That's why more wear them. And the Hy-Test in-plant servicing plan makes it easy for all to have this Hy-Test protection. Write for details.

THE WORLD'S LARGEST SELLING SAFETY SHOE

HY-TEST *Safety Shoes*

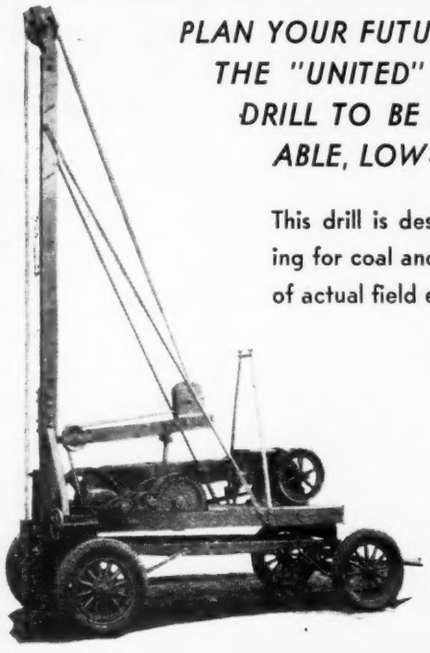
HY-TEST DIVISION • INTERNATIONAL SHOE COMPANY • ST. LOUIS 3, MO.
EASTERN OFFICE • MANCHESTER, N. H.

HAULAGE COST CUT with UNITED TRAILERS

★Plan your future haulage now—with the advice of our engineers, men who know the haulage problems you face, and the kind of trailers best fitted to do it. Address your inquiry to United Iron Works Company, Pittsburg, Kansas.

•

Years of experience brings you this new modern "United" Automatic Bottom Dump Semi-Trailer

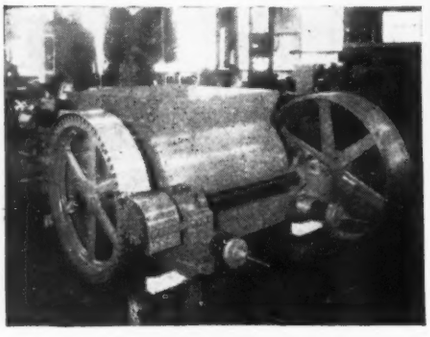


PLAN YOUR FUTURE OPERATIONS WITH THE "UNITED" PORTABLE PROSPECT DRILL TO BE ASSURED OF DEPENDABLE, LOW-COST RESULTS.

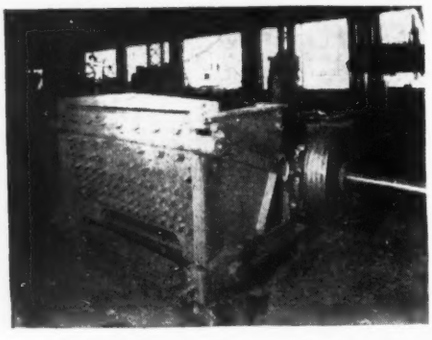
This drill is designed especially for prospecting for coal and the design is backed by years of actual field experience.

Manufacturers of

- 6 to 50 ton trailers
- coal pinning machines
- coal crushers
- pick breakers
- vibratory screens
- conveyors
- feeders
- loading booms
- shaking screens



Single Roll Crusher—reduces medium size lump to 1"



Pick Breaker—reduces large size lump to egg or nut

To get the kind of results that mean increased sales—use

"UNITED" Single and Double Roll CRUSHERS...PICK BREAKERS

Here is your immediate and permanent answer to low cost dependable reduction of large and medium size lump.

WRITE FOR COMPLETE DETAILS

UNITED IRON WORKS COMPANY

ENGINEERS • FOUNDERS • MANUFACTURERS

PITTSBURG *Trailers, and Coal Mine Equipment* KANSAS

QUESTION:

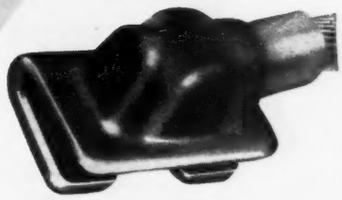
HOW SOON CAN YOU SHIP

MESCOWELD RAIL BONDS?

ANSWER:

TODAY!

When coal production is held up due to lack of rail bonds, you can get immediate action by ordering MESCOWELD. For MESCOWELD Rail Bonds are carried in stock for shipment the day your order is received . . . 18 types to meet every requirement. Moreover, they have been designed for rapid installation . . . further eliminating costly delays.



M8-F—Separate Joint Bond for straight line welding. Terminal has an extra pocket which increases the welding area about 15% and lowers current resistance.

M8X-F—Combination bond, consisting of one joint and one Cross Bond, which assures greater conductivity because it is built as a single unit. Use of three terminals instead of four saves one weld.

M5-F—Can be used on top base of any size rail. Terminal hook holds bond in place while weld is being made. Solid terminal prevents installation damage.

WHY LEADING COAL PRODUCERS PREFER MESCOWELD

1. Copper cables are joined to terminal heads by the patented Electric "Flashweld" method which effects a perfect union of each wire in the stranded cable with the terminal. There are no dead ends, no current losses.

2. Terminal heads are over-size, providing an unusually large welding area which increases conductivity. Heads are forged from best quality mild steel which is a better conductor than carbon steels.

In addition to Rail Bonds, MOSEBACH manufactures a complete line of track and trolley products for the mining industry. These include *section Insulator Switches, combination Trolley and Feeder Switches, Trolley Wheels,* and *Trolley Splicers.* Distributors are located in principal coal mining centers.

Write for catalog describing 18 styles of MESCOWELD Rail Bonds and other Mosebach products.

MOSEBACH ELECTRIC & SUPPLY CO.
1115 ARLINGTON AVE. • PITTSBURGH, PA.
Telephone: HEmlock 8332

COMPLETE LINE OF TRACK AND TROLLEY PRODUCTS FOR THE MINING INDUSTRY

Hammond's

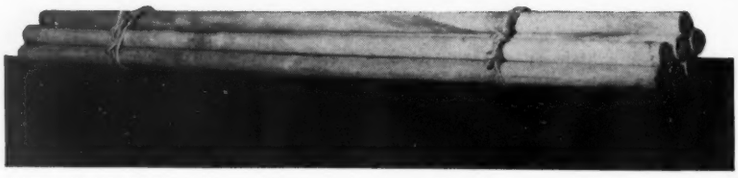
Safety Equipment

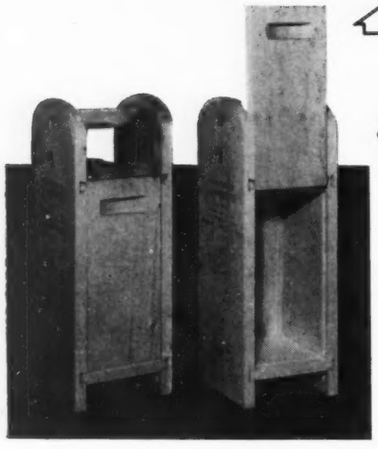
for efficient handling of Explosives

Here is your first view of the HAMMOND Safety Shot Firing Unit . . . a design innovation that insures absolute safety and 100% effectiveness over long periods of use. *A test unit was fired 2,146 times before battery change was required.* Points of greatest importance and advantage to you include these:

1. **Unit features all wood construction, impregnated with "Arboneeld" and parrafin, making the case moisture and warp resistant.**
2. **Electric contact is made inside the case through a protective slide.**
3. **Unit employs ordinary flashlight batteries for economical maintenance . . . batteries easily replaced through bottom of case. Energized contact cannot be made at bottom of case.**
4. **Shot firing units available up to maximum permissible voltage in single shot blasting units.**
5. **The unit as designed by HAMMOND meets all inspection standards (Approved by U. S. Bureau of Mines, April 2, 1945)**
6. **Safety is an absolute certainty with this battery unit. Everything has been done to eliminate accidental energized contacts, damage from moisture and short circuits and stray current seepage.**

The HAMMOND Shot Firing Unit is, as pictured, as compact and free from unnecessary details as technically possible. It is economical to maintain and easy to operate . . . from every standpoint a superior product—one that every mine should be equipped with. Write for more detailed information today. Price per unit complete with battery $3.90.

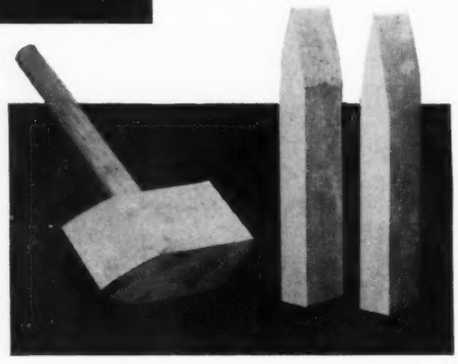




Wood tamping poles made of hardwoods lengths to 12 ft. 1 inch diameter 5c per lineal ft., 1-¼" diameter 6c per lineal foot and 1½" at 8c per lineal ft.

Explosive Boxes, made entirely of wood having no metal parts, tongue-grooved and dovetailed construction with automatic lock using a rubber band for a spring, treated with paraffin to make moisture resistant. "Approved by Penna. Dept. of Mines". Sizes as listed based on 1-¼" x 8" sticks.

No. 9 Powder box	1.12
No. 12 Powder box	1.27
No. 16 Powder box	1.43
No. 20 Powder box	1.58
No. 36 Powder box	2.94
No. 72 Powder box	4.23
No. 8 Detonator box sizes 2x2½x8" inside	1.01
No. 6 Detonator box sizes 2½x3x6" inside	1.01



Wooden Mallet and wedge sets for opening explosive cases made of hardwood, mallet doweled to prevent splitting
Price $4.50 per set

J.V. Hammond Co
Spangler, Penna.

Manufacturers of Tamping Poles, Shot Firing Units, Wooden Mallet and Wedge Sets, Explosive Boxes, Trolley Poles, Sounding Sticks, Mine Rollers, Insulation Blocks and Brake Blocks.

to a 20-ft.-dia. x 40-ft.-deep concrete stave bin, from the bottom of which two apron feeders deliver the rock to trucks for disposal.

Gulf Mining Co., Crab Orchard, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washer to handle 8x2½-in. egg; capacity, 60 t.p.h.

Pond Creek Pocahontas Co., Mine No. 1, Bartley, W. Va.—Contract closed with Kanawha Mfg. Co. for rescreening plant to handle ⅜x0-in. coal at a rate of 160 t.p.h., making ⅜x⅛-in. stoker and ⅛x0-in. slack; coal is carried from main tipple to rescreening plant by scraper conveyor which distributes to five 5x12-ft. sloping vibrating screens. Variable-speed rotary-vane feeders deliver coal onto vibrators. Also, additions to cleaning plant consisting of new shaking picking table for lump and crushing and recirculating system for middlings. Egg is washed in a Kanawha-Belknap unit; capacity, 50 t.p.h. of 7½x3-in. coal.

Winifrede Collieries, Winifrede, W. Va.—Contract closed with Kanawha Mfg. Co. for complete preparation plant housed in steel structure; consists of trip feeder, automatic recording scale, power rotary dump, electrically operated bypass for rock, apron feeder and belt conveyor to 450-ton concrete-stave surge bin; coal is conveyed by belt from bin to three-boom tipple; capacity of system from dump to surge bin, 550 t.p.h.; capacity of tipple, 200 t.p.h.

Locust Coal Co., Shenandoah, Pa.—Contract closed with Deister Concentrator Co. for one SuperDuty Diagonal-Deck No. 7 coal-washing table for cleaning No. 1 buck.

Raymond Wren, Williamstown, Pa.—Contract closed with Deister Concentrator Co. for two SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning No. 4 buck.

Adelphia Coal Mining Co., Lytle, Pa.—Contract closed with Deister Concentrator Co. for eight No. 7 SuperDuty Diagonal-Deck No. 7 coal-washing tables for treatment of No. 4 buck and two Concenco revolving feed distributors.

Indian Run Coal Co., Indian Run, Pa.—Contract closed with Wilmot Engineering Co. for two Type D Wilmot Simplex jigs to prepare stove and nut coal; feed capacity, 40 t.p.h.

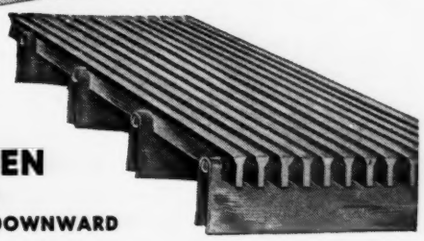
Phoenix Coal Co., Phoenix Park, Pa.—Contract closed with Wilmot Engineering Co. for one Type D Wilmot Simplex jig to prepare nut coal, capacity 20 t.p.h.; and one Type C Wilmot Simplex jig to prepare broken coal, capacity 35 t.p.h.

Dark Water Coal Co., Wolf Creek Colliery, Darkwater, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft.-diameter Wilmot Hydrotator to prepare barley coal; capacity, 15 t.p.h.

Williams Coal Co., Mannington, Ky.—Contract closed with Deister Machine Co. for two No. 16 Deister Plat-O coal-washing tables, 8-meshx0; feed capacity for each, 15 t.p.h.

INCREASE PRODUCTION
LOWER MAINTENANCE

SIZING AND DEWATERING FINE COAL



WITH THE
PROFILE-BAR
WEDGE-BAR SCREEN
WITH CONTINUOUS
SLOT OPENINGS ENLARGING DOWNWARD

CONTINUOUS SLOTS	=	GREATER OPEN AREA
OPENINGS ENLARGED DOWNWARDS	=	QUICK DISCHARGE OF UNDERSIZE—NO BLINDING
DEEP SECTION PROFILE BARS U-SHAPED CROSS SUPPORTS	=	ASSURE GREATER CARRYING CAPACITY AND LONG LIFE
SUM TOTAL	=	GREATER EFFICIENCY AND LONGER LIFE

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Dustproofing coal with Wyandotte Calcium Chloride is safe, economical, easy. A little does a lot to produce that special sheen that means sales appeal. When you dustproof coal you automatically freezeproof too!

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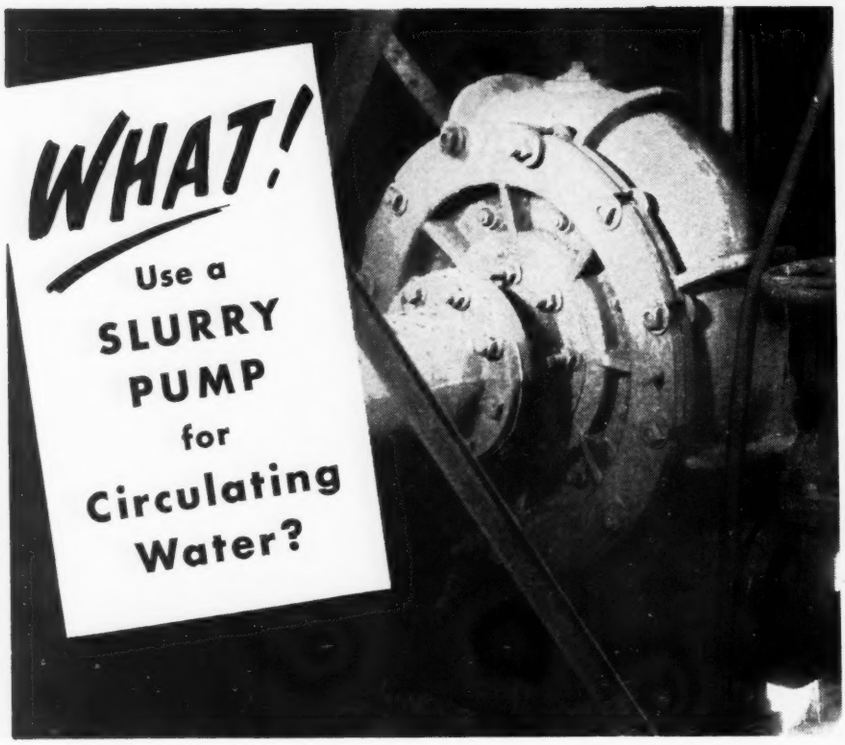

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Proves that it pays!

Sure, they call it *circulating* water. But examine your washery water closely and you'll see that it is really a slurry — carrying a considerable quantity of fine abrasive solids. Solids that quickly scour away the circumferential sealing rings and the thin casting sections of the conventional water pump. That's why conventional water pumps in *circulating* water service rapidly lose efficiency and are subject to excessive and costly replacement of rings. Life of the pump itself is not up to normal expectancy.

Morris Slurry Pump Design Insures Long Life and Economy

The Morris Type M materials handling pump illustrated is typical of the pumps we recommend for circulating water. Pumps that are hydraulically and mechanically designed for the express purpose of handling solids. Wider clearances, suctions of large diameter, and impellers with easy entrance curves reduce friction and abrasive action.

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Let Morris' 83 years of pump-building experience help in selecting the correct pump for your needs. Just send us a detailed statement of your problem. Or write for bulletin.

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BALDWINSVILLE, N. Y.
Branch Offices in Principal Cities

MORRIS **CENTRIFUGAL PUMPS**

Coal Publications

Suggested Methods for Installing Dust-Allaying Equipment in Bituminous-Coal Mines, by C. W. Owings, U. S. Bureau of Mines. R.I. 3843; 56 pp., 8x10½-in.; paper, mimeograph, free. This covers the suppression of dust in all parts of mines. The quantity of water used and the quantity of dust in suspension may be reduced by adding a suitable wetting agent to the water. Quantity of water used has been reduced as much as two-thirds, and dust floating in air as much as 80 percent by adding a wetting agent to water. All-bronze turbine pumps are best suited for the low-capacity, high-pressure nozzles of individual pieces of equipment or on water tanks for feeding such nozzles with water. Self-cleaning strainers should be provided on intake side of pumps to reduce wear and clogging of sprays.

Design of Injectors for Low-Pressure Air Flow, by G. E. McElroy, U. S. Bureau of Mines. T.P. 678; 49 pp., 5¾x9-in.; paper. Price, 10c. This paper presents formulas for facilitating design of compressed-air injectors and a proposed Venturi design for use in providing auxiliary injector-pipe ventilation of working places in mining. Injectors can be designed for high efficiency or for high ratio of total air flow delivered by jet, but not for both, as efficiency and quantity are reciprocal values; when one rises, the other falls.

Analyses of Ash From Coals of the United States, by W. A. Selvig and F. H. Gibson, U. S. Bureau of Mines. T.P. 679; 20 pp., 5¾x9-in.; paper. Price 10c. These ash analyses are given as oxides, as is usual, though the minerals appear in ash as a mixture of silicates, oxides and sulphates with small quantities of phosphates and other compounds. Initial-deformation, softening and fluid temperatures for each sample are given, also bed, mine and size of coal sampled.

Resins in Coal, by W. A. Selvig, U. S. Bureau of Mines, T. P. 680; 24 pp. 5¾x9-in.; paper. Price, 10c. (Not immediately available.) Resin is present in most coals, being visible in thin sections under the microscope. It is so intimately mixed with the coal that it cannot be removed by mechanical methods. Macroscropic or lump resin is visible to the naked eye and can be recovered by crushing the coal followed by flotation. Some resinous Western coals have about 5 percent of lump-type resin and, according to published information, says Mr. Selvig, may be suitable for making cheaper-grade dark varnishes. According to A. Nagelvoort, lump-form resins recovered by flotation from resinous Utah coals contain waxes and asphaltic substances, which, if removed, give a resin suitable for making light-colored varnishes.

Relative Spontaneous Heating Tendencies of Coals, by J. L. Elder, L. D. Schmidt, W. A. Steiner and J. D. Davis, U. S. Bureau of Mines. T.P. 681; 24 pp., 5¾x9-in.; paper. Price, 10c. These seven conditions favor spontaneous combustion of coal: (1) lowness of rank (lesser maturity) of coal; (2) high temperature during storage; (3) coal

A POWERFUL *Production Tool!*

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THE *PRODUCTIVE* CAP LAMP

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Developed by mine-lighting experts for expert miners

1. 20% brighter light at working face.
2. Compact, lightweight, balanced, streamlined.
3. Steady, dependable light; 80% efficient at the end of the shift.
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Underground, this outstanding producer of brighter, steadier, *better* light makes all tools more effective. Because WHEAT starts bright and stays bright through the entire shift, it makes production rates go up — accident rates come down.

Miners, equipped with the WHEAT *approved* electric cap lamp, do more because they see more. This is the lamp that takes danger out of the dark. By improving the quality and quantity of light at the working face it automatically improves the quality and quantity of the product output. Facts prove that WHEAT-equipped mines turn out more . . . better and faster.

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newly mined and thristing for oxygen; (4) availability of oxygen to coal during storage; (5) large surface area per unit weight of coal; (6) low-moisture content; (7) low-ash content.

Carbonizing Properties of Powellton-Bed Coal From Coal Mountain Mine, Guyan, Wyoming County, W. Va., by D. A. Reynolds, J. D. Davis, W. H. Ode, R. E. Brewer and C. R. Holmes, U. S. Bureau of Mines†. T.P. 683; 44 pp., 5¾x9-in.; paper. Price, 15c.

The Foreman and the Veteran, for foremen, supervisors and department heads, by T. Handelman, 32 pp., 4⅛x6¼-in.; hard paper cover. Price 25c. *What's Ahead for the Veteran*, by T. Handelman, 22 pp., 3⅜x5¼-in.; hard-paper cover. Price 15c. National Foremen's Institute, Inc., Deep River, Conn. Two excellent books for distribution at discount rates, written by an ex-sergeant in the Army.

A Graphical Form for Applying the Rosin and Rammler Equation to the Size Distribution of Broken Coal, by W. S. Landers and W. T. Reid, U. S. Bureau of Mines, I.C. 7346; 6 pp., 8x10½-in.; paper; mimeograph, free.

Illinois Mineral Industry in 1944, by W. H. Voskuil and D. F. Stevens, Illinois State Geological Survey, Urbana, Ill., R.I. 109; 90 pp., 6¾x9⅞-in.; paper. Coal and coke is apportioned 30 pp. In 1941, Illinois produced in the January-March quarter 20,895,000 tons and in April-June, 19,078,000 tons; but in 1941, before the U.S.A. entered the war, the corresponding figures were 16,480,000 tons in the first and best quarter and in the Spring, leanest quarter, only a trifle more than half as much, namely 8,637,000 tons. Report covers methods of coal production, 1935-1944, sources of coal received by railroad and lake cargoes in several cities and States where Illinois coal competes, 1943-44, coal-mine prices, December, 1944, distribution of Illinois coal, types of heating equipment used, degree-days of several cities, briquetting, and coke. In 1944, dock cities on Great Lakes led in briquetting; Minnesota 515,671 tons, Wisconsin 448,313 tons. Illinois is sixth in list, 90,358 tons, but increasing.

Accidents From Falls of Roof and Coal in Bituminous Mines, Coal-Mine Accident-Prevention Course, Section 2, U. S. Bureau of Mines. Miners Circular 48; 114 pp., 5¾x9-in.; paper. Price, 25c.† An exhaustive study of roof support. Not a statistical study of such accidents. Nothing appears to be said as to side of room on which track should be located.

Medicine in Industry, by B. J. Stern, The Commonwealth Fund, 41 E. 57th St., New York; N. Y. Academy of Medicine. 200 pp., 5½x8½-in.; cloth. Price $1.50. History of industrial medicine, social and legislative backgrounds, extent of disability, handicapped worker in industry, preventive services, medical care and health insurance, the industrial physician.

† Apply Superintendent of Documents, Washington, D. C.

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No matter how tough the job...if wire rope is part of the equipment needed, you are sure of results if you "follow through" with HERCULES (Red-Strand) Wire Rope.

Its high tensile strength, plus exceptional ability to withstand heavy duty performance, has placed it high on the list of approved equipment in *all* industrial fields. Being made in Round Strand and Flattened Strand constructions – Preformed or Non-Preformed – there's a type exactly fitted to meet every wire rope requirement.

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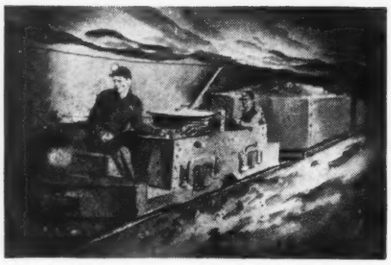
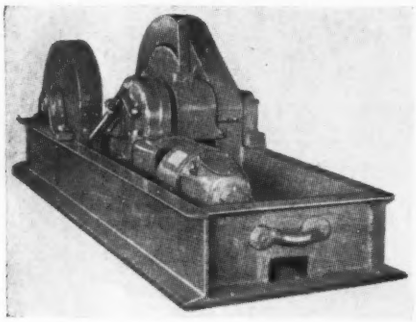


Equipment News

Car-Spotting Hoist

A car-spotting hoist said to be of an entirely new design in which a 30 to 1 worm gear reducer replaces that normally furnished has been announced by the Flood City Brass & Electric Co., Johnson, Pa. The unit is equipped with a 5-hp. motor and provides

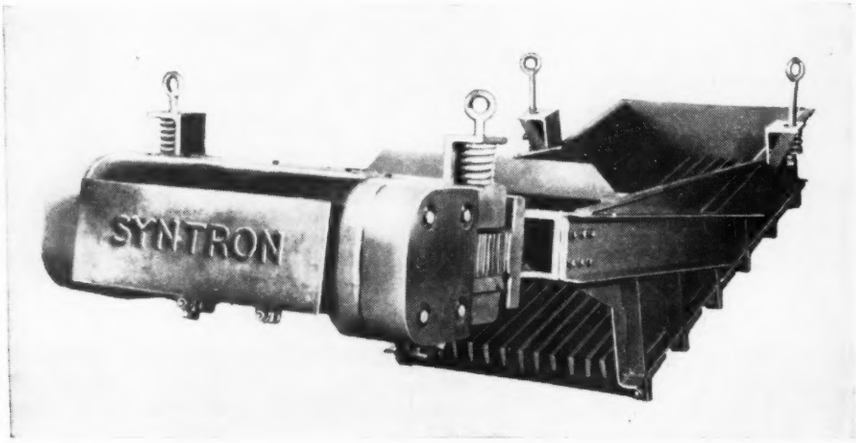


a rope pull of 6,000 lb. at 35 ft. per minute. The worm drive is non-reversible so that the drum is immovable when the motor is at a standstill. The unit is guarded at all points, according tto the manufacturer, and a powerful brake mechanism and jaw clutch is provided.

•

Screening Grizzlies

Syntron Co., 975 Lexington, Homer City, Pa., offers the Model F45 large-capacity heavy-duty screening-grizzly feeders. According to the manufacturer, the type of construction used places the pulsating magnet forward and above the grizzly deck, utilizing full length of the grizzly for material separation and discharge. Its movement is said to be upward, forward and back, momentarily leaving the material suspended, then repeating this movement 3,600 times per minute. It is emphasized that rheostat control of feed enables the operator to equalize the feed of material with the capacity of the crusher, and the feeders are easily arranged for automatic control.



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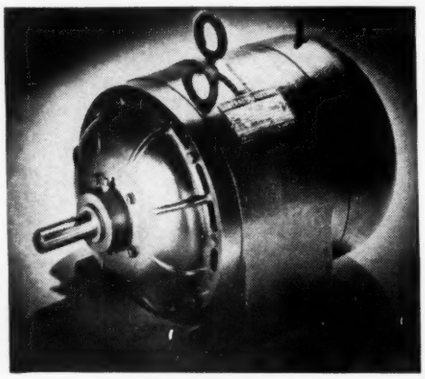
Fan-Cooled Motor

A new totally inclosed fan-cooled motor especially designed for use in extremely dusty, dirty and corrosive atmosphere has



been added to the line of Tri-Clad induction motors made by the General Electric Co., Schenectady, N. Y. The new motor is available in standard, explosion-proof and dust-explosion-proof types from 1 to 1,000 hp. It can be used where iron dust and metal filings are in the air and in Class I Groups C and D and Class II Groups E, F and G hazardous locations. Short in length and compact in construction, the motor can be installed in a small space, making it suitable for machine-tool applications where the motor must be part of the driven machine.

The new Tri-Clad Motor features special protection from external blows, dripping water, dusts, vapors and corrosive liquids. Punchings and windings within the inner shell of the motor are cooled by a non-sparking external fan which is protected by a cast-iron housing with a screened air-intake opening. Low starting current makes the new Tri-Clad suitable for full-voltage starting, thus permitting the use of simple inexpensive control equipment, it is stated.

•

Truck Tire

A new-type truck tire with special tread design to meet needs of vehicles that operate both on and off the highway has been put into production by the Goodyear Tire & Rubber Co. Known as the Hi-Way Lug, it

is said to have a deep non-skid extra-heavy tread plus strength in the rayon-cord body to provide the cut and bruise protection, traction and wearing qualities needed for the type of punishment taken by tires in logging, gravel, operating and coal mining where

Precisionbilt LIKE A FINE GUN

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J&L Wire Rope is made with precision by skilled men with the same patient attention to detail, the same insistence upon quality material, as the best hand-made match piece.

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PITTSBURGH 30, PENNSYLVANIA

J&L *Precisionbilt* PERMASET PRE-FORMED WIRE ROPE

tires must go in off the road, bring out the load and then complete the hauls on hard surfaced roads, according to the manufacturer.

The Hi-Way Lug tire will outwear standard tires, it is said. The lugs are placed close together for smooth-rolling and long, even tread wear. The alternate long and short bars provide extra traction when "in the rough." First tires will be made available in the three sizes of 9.00, 10.00 and 11.00-20.

•

Silicone Rubber

Silastic, the heat-stable silicone rubber developed and produced by Dow Corning Corp., Midland, Mich., in commercial quantities to meet urgent warime uses, is now available in improved stocks for the fabrication of Silastic products twice as strong, tough and elastic as the earlier materials.

According to the manufacturer, the stocks now available, when properly cured, have physical and mechanical properties that recommend them for industrial applications in which thermal stability and oxidation resistance, combined with waterproofness and high surface resistivity are important factors. Their electrical properties recommend them for use as an insulating material at normal industrial voltages and frequencies.

Silastic can be molded or extruded into any required shape and can be applied as a coating for glass cloth, metal or wire. It makes possible simplifications in the design of equipment and installations. Folders describing the material may be had from the manufacturer on request.

•

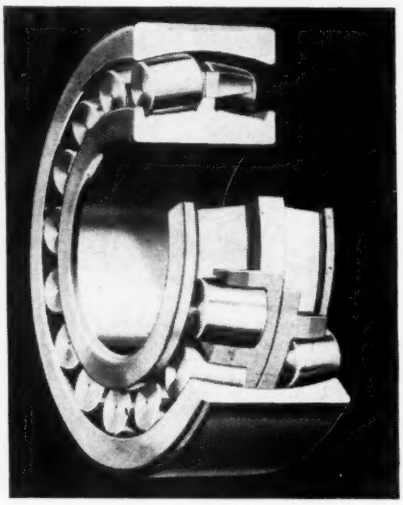
Drill Bit

New England Carbide Tool Co., 60 Brookline St., Cambridge, Mass., offers a carbide-tipped cyclone drill for drilling holes in concrete, cement, brick, tile, marble and other forms of masonry material, asserting that it will do the work 50 percent faster and last 50 to 75 percent longer than high-speed drills. These bits are used in an ordinary rotary electric drill, said to eliminate hammering, being light, easy to handle and quiet in operation, and giving accurate, clean holes in the shortest possible time.

•

Roller Bearing

Bantam Bearings Division of the Torrington Co., South Bend 21, Ind., offers a self-aligning spherical roller bearing as a new addition to its line of anti-friction bearings,



which already includes straight roller, tapered roller, needle and ball.

This new spherical roller bearing is said to be adaptable to heavy-duty performance in a wide range of equipment. In addition to the self-aligning feature it offers (1) two-directional thrust, (2) high radial capacity, (3) high thrust capacity and (4) unit construction for easy installation. The new unit will be produced in a full range of sizes from 1.5748-in. bore upward.

•

Protective Clothing

Hodgman Rubber Co., Framingham, Mass., offers No. 1081, heavy-duty rubber surface suit, suitable for miners and wherever resistance to corrosive and abrasive materials is necessary. Jacket and overalls have thick layer of black general-purpose synthetic rubber on the surface of a strong fabric, friction coated on the inside; seams full cemented, and gum strapped where necessary; rivets at tension points; vulcanized as a unit after making.

No. 1032 is a medium-weight suit designed for workers obliged to work under wet or muddy conditions. Made of white-backed sheeting with general-purpose synthetic rubber; durable ball and socket snap fasteners; rivets at points of tension; vulcanized as a unit after making.

No. 1060, surface work suit, is the same as 1032 except that neoprene coating has been used instead of general-purpose synthetic rubber.

No. 1090, leggings, provide medium-weight waterproof protection for trousers and legs, consisting of black general-purpose synthetic rubber coating on sheeting with white back; full cemented seams, strengthening hem at top and bottom of legs; rivets at points of tension.

No. 3062, waders, have black general-purpose synthetic rubber surface on strong jersey-type fabric; seams cemented and strapped; rubber crotch and inseam reinforcement; strong black rubber boots with cleated sole and molded heel; bib front for extra height; rivets at tension points; vulcanized after making.

•

Fire Extinguisher

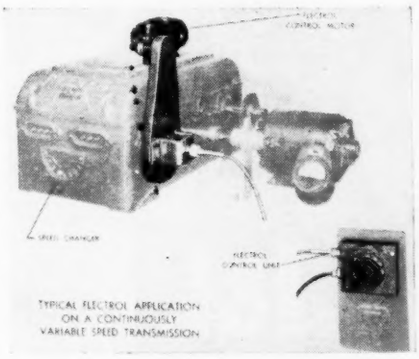
General Detroit Corp., Detroit, and General Pacific Corp., Los Angeles, offer a carbon monoxide portable fire extinguisher in a complete range of sizes from 2o to 100 lb. Called the CD-Sno Fog, it is especially recommended for fighting fires in electrical equipment, oil, grease and flammable liquids. As the carbon monoxide is a non-conductor, it is said to be safe to use on electrical fires even while the current is on; leaves no stain on clothing, equipment or premises; and is equally effective in hot or sub-zero temperature.

The heavier-than-air carbon dioxide gas penetrates into remote corners, replacing the oxygen necessary for combustion and thus smothering the blaze. The cylinder of the extinguisher is made of high-grade steel with brass fittings. The discharge horn is of shock-resistant plastic construction.

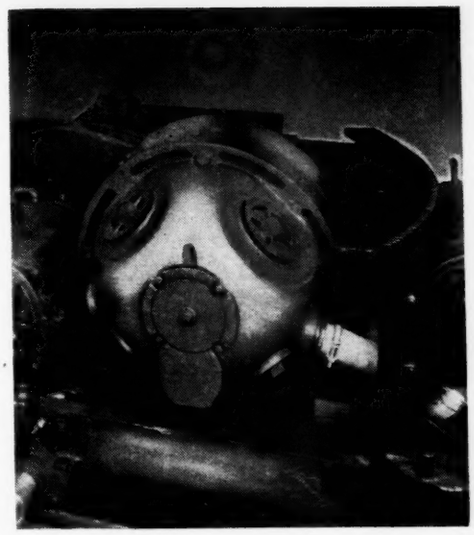
•

Remote Control

Electrol, for application to commercial speed changers to provide finger-tip remote control of speed, is offered by the Yardney Laboratories, Inc., 105 Chambers St., New York 7. According to the manufacturer, the dial can be set instantaneously to any



desired speed and the speed changer will follow as fast as the electric servo motor can drive the speed-adjusting screw. The dial can be calibrated in r.p.m., feet per minute, gallons per hour, etc. In operation Electrol is said to control the rotation of



POWER CONSUMPTION?

—the smallest power requirement of any loader of equal capacity

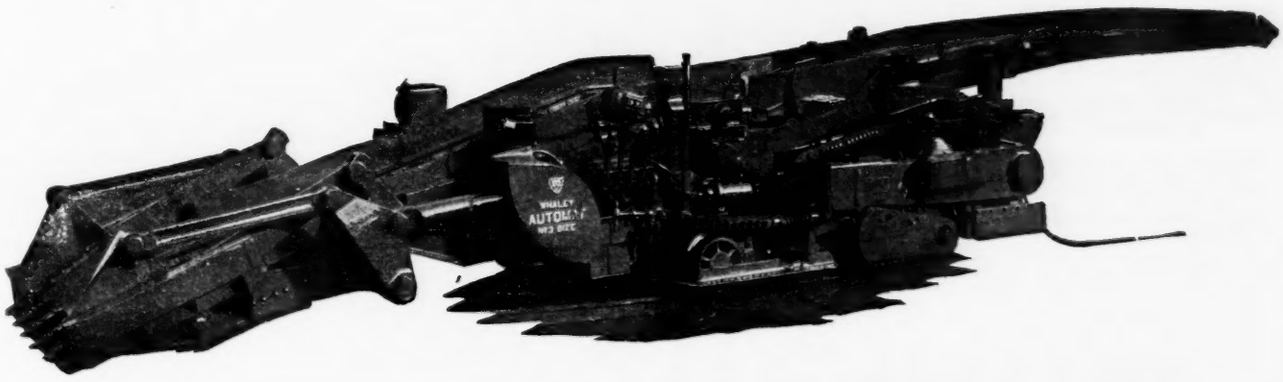
Only one motor, and that only 25 horse power. This is ample power requirement for the Whaley "Automat," with its rated capacity of 7 Tons per minute, and an average loading rate of 3 Tons a minute. With a power consumption of only 1/5 K. W. H. per ton of materials loaded, the Whaley "Automat" is well known for lowest power consumption per ton of material loaded.

When we speak of Materials Loaded we mean coal, rock or slate . . . for, the Whaley "Automat" is built to handle any of these materials with equally effective results.

In addition, remember, the "Automat" will load, in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larries can take.

For full information on the Whaley "Automat" please furnish us data on your mining conditions with your inquiry. Myers-Whaley Company, Knoxville 6, Tennessee

Wm. Neill & Son, Ltd., St. Helen's Junction, Lancashire, England, are licensed for Manufacture and Sale in Great Britain and Europe.



MYERS-WHALEY

Mechanical Loaders Exclusively For Over 38 Years

Manufacturers of Carbon, Electrographitic, graphite and metal-graphite brushes for use on motors, generators and electric control equipment.

Standard Brushes FOR MINE AND MILL EQUIPMENT

Standard brushes are cut from plate manufactured in our own plant, and grades to meet any service, and on all types of mining equipment are carefully controlled.

Standard has specialized in the manufacture of brushes for mine and mill equipment for 17 years.

Competent service engineers are prepared to make applications and recommend the best brush for your equipment.

A new and modern carbon plant, located to give prompt service to a large section of the bituminous coal industry assures prompt and efficient service.

Write for catalogue. Your inquiries will receive our prompt attention.

STANDARD CARBON Co.

Address P. O. Box 49, Steubenville, Ohio
Telephone: Steubenville 4-1611, 4-1612

Steubenville Ohio

A New Locomotive Backed by 25 Years' Experience in the Battery Locomotive field!

GREENSBURG
"RANGER" STORAGE BATTERY
LOCOMOTIVES

All Locomotives CUSTOM-BUILT to your requirements

FEATURES

Oil-tight, leak-proof transmission. Use regular auto oil; change every 6 months.

Strong. Simple. Low maintenance cost.

Extra-long journal springs assure better trackability.

Large motor, to assure more horse power per ton weight of locomotive.

Can be equipped with hydraulic brake.

This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4½ ton locomotive, operating on 30" gauge track. This locomotive built from 3½ to 10 tons — either single or double motor drive — 16" to 56½" track gauge. Also factory rebuilt storage battery locomotives with new locomotive guarantee.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

THE GREENSBURG MACHINE CO.
Makers of Custom-Built Storage Battery Locomotives
101 STANTON ST., GREENSBURG, PA.

the small motor used to adjust the pulleys or gears of the speed changer; rotation of the speed selector dial causes this motor to drive the adjusting screw until the output speed of the controlled device corresponds to the speed selected on the dial.

•

Diaphragm Cloth

Of interest to pump and diaphragm manufacturers is to the new 80/80 base Stye DL-O11 diaphragm cloth now being produced by Irvington Varnish & Insulator Co., 6 Argyle Terrace, Irvington 11, N. J.

In addition to having good mechanical strength, it is asserted that this cloth retains its flexibility and is practically unaffected by relatively wide temperature changes. It is recommended for application where strength, flexibility, operating temperatures and resistance to certain solvents are important considerations. It is available in standard 100- to 500-yd. rolls, approximately 37 in. wide.

•

Electric Hoist

Lisbon Hoist & Crane Co., Lisbon, Ohio, has introduced its Bob Cat Model electric hoist, said to be one of the smallest in overall dimensions among standard hoists. Of revolutionary design, according to the manufacturer, it is half the weight of other hoists of the same capacity and can be easily erected or moved. Made in practically three sections, it permits complete access by removal of four bolts. The motor is entirely drum-inclosed; gears are all heat-treated alloy steel; and ball bearings are employed throughout.

•

Conveyor Screw

As the blades of conveyor screws are subject to maximum wear and have to be replaced periodically, substantial savings can be effected by welding the blade to the shaft, says the Lee Spring Co., Inc., 30 Main St., Brooklyn 1, N. Y., which offers blades, formed from a ribbon of steel, in carbon, stainless and alloy steels, bronze and other materials.

The Lee conveyor screw, according to the manufacturer, consists of a band of steel, wound edgewise and pitched to form a helix. Its salient features are said to be: low first cost, great strength, light weight and maximum delivery volume. Illustrated folder obtainable.

•

Adjustable Quadrangle

An adjustable quadrangle combining many drafting features not usually available in one instrument is offered by the Stewart-Jackson Instrument Co., A. G. Bartlett Building, Los Angeles 14. According to the manufacturer,

(Continued on page 228)

UNIT 514

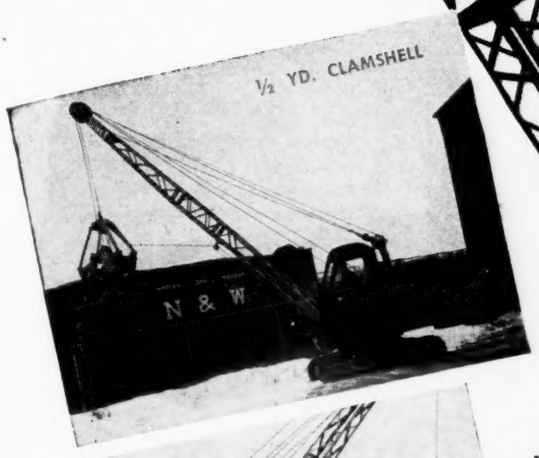
5 TON CRANE

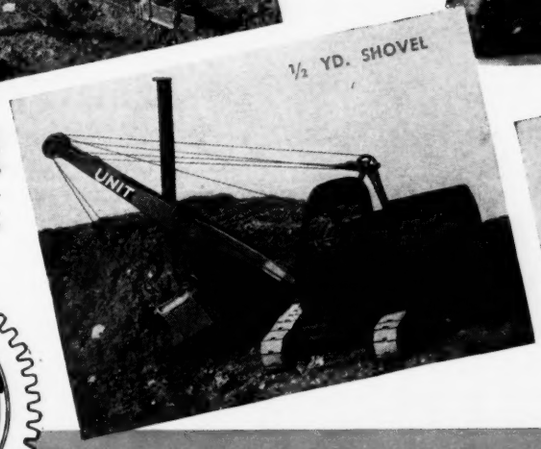
Speeds up Material Handling!

For speed, flexibility and unequalled performance, you just can't beat this UNIT 514. Ultra-modern in design, it has plenty of brawn and power to take hard, everyday punishment. Equipped with famous UNIT one-piece cast case to provide perfect alignment of all working parts. Low initial cost and low upkeep assures maximum economy over a long period of years. It will pay you to investigate.

Write for literature.

New, Full Vision Cab provides maximum visibility. Operator can see in ALL directions. Promotes safety. Increases efficiency.





CONVERTIBLE to All Attachments

Shovel . . . Clamshell . . . Dragline . . . Trenchoe . . . . . Magnet . . . Pile Driver . . . Back Filler.

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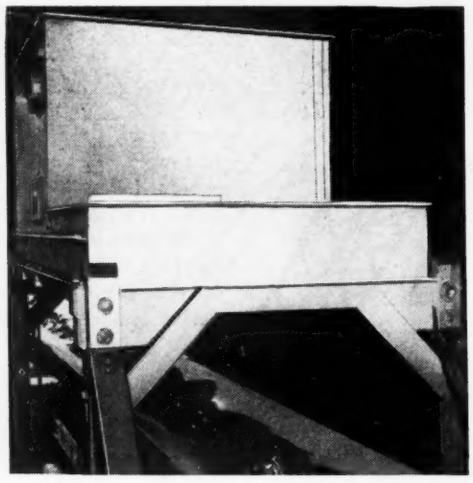
COAL FOR VICTORY

was weighed on

MERRICK WEIGHTOMETERS

INSTALLED ON BELT CONVEYORS



KENTUCKY

Republic Steel Corp. Republic Mine, Pikeville, Ky.

West Kentucky Coal Co. North Diamond 2, Earlington, Ky.

OHIO

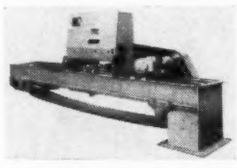
Hanna Coal Co. Piney Fork No. 1
Piney Fork, Ohio
Pennsylvania (Bituminous)

Weirton Coal Co. Isabella Mine, Isabella, Pa.

Weighs and Records *without stopping the Conveyor*

Thousands upon thousands of tons of "Victory" coal were *weighed while being conveyed*, on moving belt conveyors on which were installed *Merrick "Weightometers"*. YOU don't have to take apart your conveyor to install or to operate a Merrick Weightometer. Can be quickly installed in any desired location. Then, without interrupting conveyor movement, it will give you an automatic accurate weight, and total weight, at location point—or any distant spot in the mill. Made in sizes to meet all tonnage requirements. Operates equally well on horizontal or inclined conveyors. Let us tell you about its many successful installations. Bulletin CA-375.

THE MERRICK FEEDOWEIGHT



Another Merrick product is the Merrick Feedoweight. Used to proportion various grades of coal. Invaluable for coal blending, for feeding coal to coke ovens and in other process work. The Feedoweight controls the *Feed rate by Weight*, automatically and registers the weight. Made in sizes to meet all tonnage requirements. Bulletin CA-551.

Write For Bulletins

Upon request, we are at your service to submit a report of just what the use of Merrick Products will accomplish in your mine, under your particular condition.

MERRICK PRODUCTS

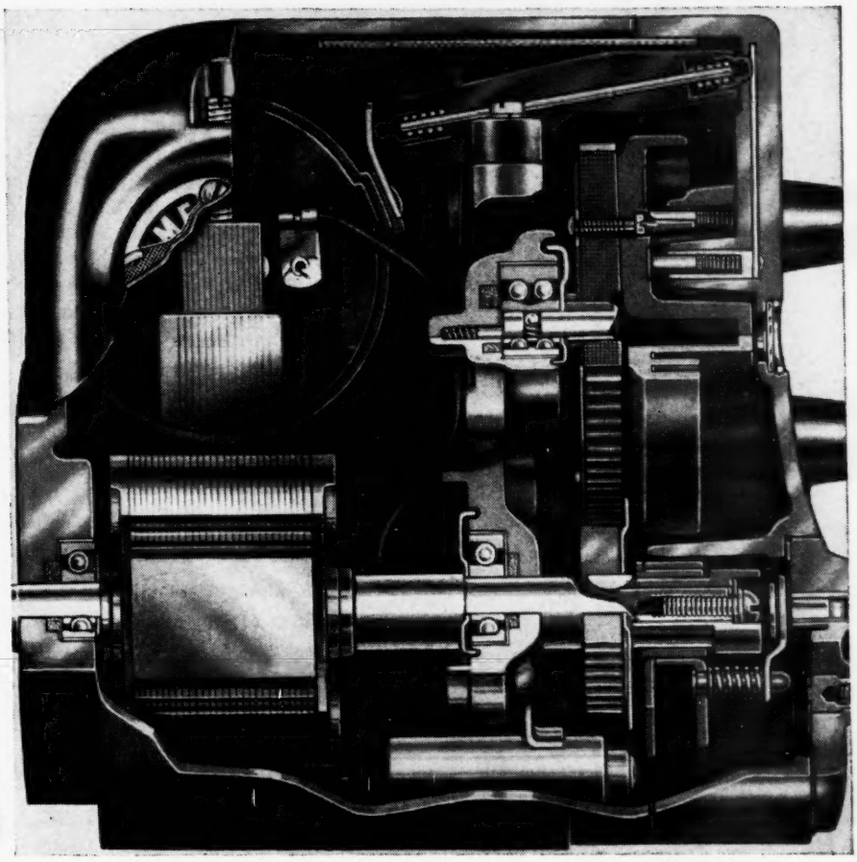
MERRICK SCALE MFG. CO.
PASSAIC, N. J., U.S.A.

DEPENDABLE ACCURATE

GOOD MAGNETOS

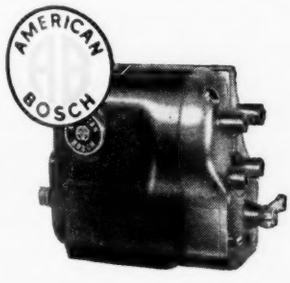
give Matched-Team Performance

A MATCHED TEAM PULLS TOGETHER, moves the load easily, keeps going steadily for long periods without tiring—in every way equal to its task.



AMERICAN BOSCH MAGNETOS GIVE MATCHED-TEAM PERFORMANCE. All components have scientifically-balanced relationships, to deliver full power output without overloading of any part.

THEY PAY THEIR WAY because they are built to take the toughest assignments and stand up under heavy service. You'll find many such hidden values behind the American Bosch trademark on all types of automotive electrical equipment.



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Super-Powered Magnetos

NEW TRIGGER-TOUCH EXTINGUISHER

SIMPLIFIES COAL MINE FIRE–FIGHTING

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CARBON DIOXIDE

Just ONE HAND snaps this extinguisher from its bracket . . . one trigger-touch sends clouds of powerful carbon dioxide into the fire—smothers it in split-seconds!

With no valves to adjust, Randolph extinguishers eliminate panic—get the employee to the blaze before it spreads.

A dry, non-toxic gas, carbon dioxide cannot freeze or deteriorate — eliminates annual refilling and costly repairs.

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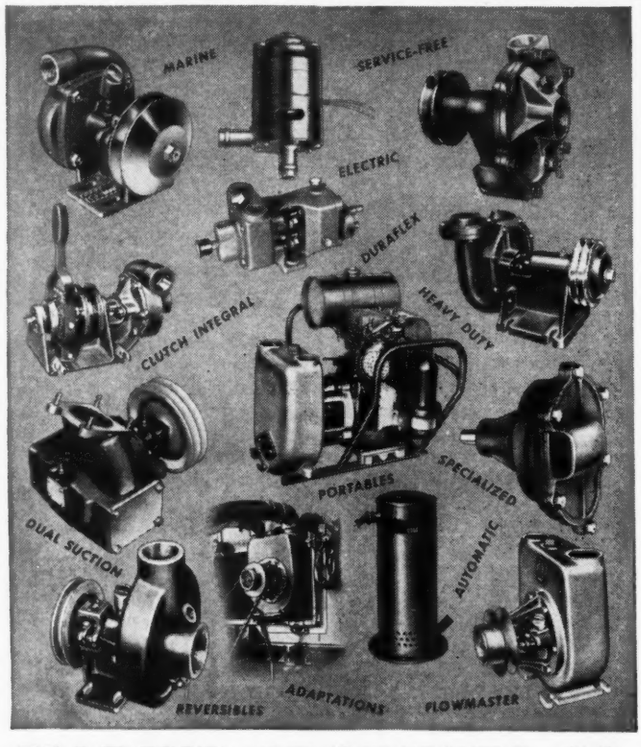


MARINE PRODUCTS CO.

ENGINEERED EQUIPMENT

Industrial MP *Marine*

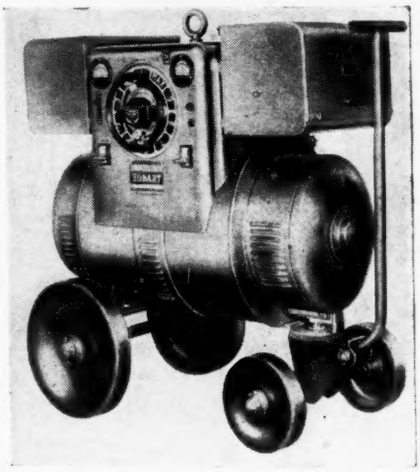
6636 CHARLEVOIX AVE DETROIT 7, MICHIGAN

angles from 0 to 90 deg.; pitch scales from 0 to 24/12; percentage slopes from 0 to 100 percent; sine or cosine functions and tangents may be found with this instrument. It has eight drawing edges, is rectangular in shape, and may be used as a triangle.

•

Charger-Welder

A battery charger-arc welder combination for charging batteries and electric arc welding has been developed by the Hobart Bros., Co., Motor Generator Corp. Division, Troy, Ohio. This dual-purpose machine was designed especially for the railroads, but is adaptable to a wide variety of shops where batteries are charged and electric arc welding is done, according to the manufacturer. It has complete separate control panels with

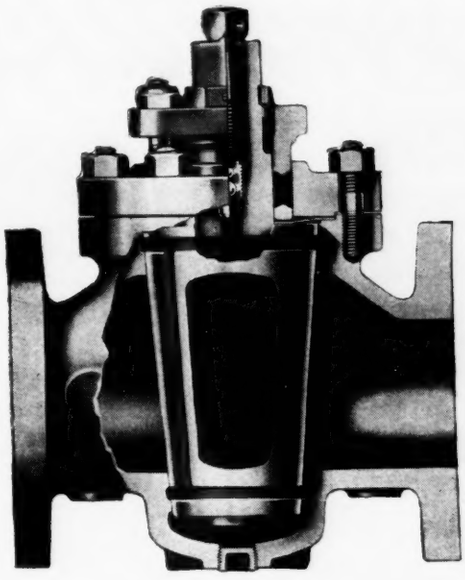


instruments—one each for the battery and charging circuits—and can easily be switched from charging to welding or from welding to charging. Model No. 496, a Hobart 300-amp. electric motor-driven welder, includes an MGC panel circuit for charging one railway coach battery at a maximum rate of 200 amp. at 50 v.d.c. Model No. 497 is a Hobart 400-amp. electric motor-driven welder and includes MGC panel circuits for charging two railway-coach batteries at one time at a maximum rate per battery of 150 amp. at 50 v.d.c.

•

Portable Brazer

For making lap joints in copper strap, attaching terminals to cable, brazing coil ends and general copper smithing work, a new portable 5-kva. brazer weighing only 30 lb. is offered by the Westinghouse Electric Corp., East Pittsburgh, Pa. The new unit, which requires connection to a 220-volt source, consists of a transformer, voltage selectors, controls and carbon-tipped tongs. A.c. from an adjustable voltage transformer passes through the tongs and parts to be brazed, raising the temperature to a point at which the brazing alloy melts. The brazing alloy may be applied in the form of a rod or in ribbon form. Three outlets are provided on the control panel for 8, 6 or 4 volts. Voltages are easily and



WALWORTH

Lubricated

Plug Valves

for **TOUGH** *assignments*

For handling petroleum products, natural or manufactured gas, acids, alkalies, solvents, slimes, surries . . . in fact for almost any hard-to-handle liquids — there's a Walworth Lubricated Plug Valve designed for the job.

Easy to operate, tight sealing, resistant to wear and corrosion, Walworth Lubricated Plug Valves assure long years of dependable service at low operating cost.

Walworth Lubricated Plug Valves are available in sizes ½" to 24" for pressures from 125 to 5,000 psi., and for vacuum requirements. For full details — prices, sizes, dimensions, and other pertinent data, see your Walworth distributor or write for Walworth Catalog No. 44L.

Walworth Lubricated Plug Valves Offer These Advantages

. . . Complete surrounding of ports with resistant lubricant affords positive seal against leakage.

. . . Lubricant grooving system assures ease of operation — tight shut-off — greater protection against corrosion.

. . . Body and plug fully protected by lubricant from attack by line fluids.

. . . Quarter turn opens or closes valve.

. . . Made in a complete range of sizes ½" to 24" and for pressures from 125 to 5,000 psi., *and for vacuum requirements.*

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valves and fittings

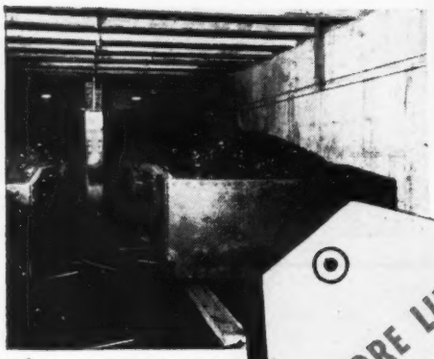
60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Write your own Ticket with

Republic HIGH STRENGTH STEELS

ALDECOR • COR-TEN • DOUBLE STRENGTH



Your ticket for

MORE LIFE without MORE WEIGHT

Your ticket for...

LESS WEIGHT without LOSS IN SERVICE LIFE

Your ticket for....

MORE CAPACITY without MORE DEADWEIGHT

Now you can design and build metal mine cars that meet each mine's individual needs. Here's what you can specify—with Republic High Strength Steels.

1. MORE LIFE WITHOUT MORE WEIGHT.

These steels have a minimum yield strength of 50,000 pounds per square inch. You can apply them in the same thickness you now use and thus build stronger cars that stand rough use for more years of service—*without any increase in weight.*

2. LESS WEIGHT WITHOUT LOSS IN SERVICE LIFE.

You have an opportunity to reduce deadweight—to cut haulage power, add extra cars per trip and reduce wear on trackage. The higher strength of these steels and their resistance to atmospheric corrosion and abrasion permit the use of thinner sections without sacrifice of service life.

3. MORE CAPACITY WITHOUT MORE DEADWEIGHT.

When conditions justify the use of larger cars, you can increase capacity without any increase in deadweight by using thinner sections of Republic High Strength Steels. In this way you haul more coal per car and cut transportation cost per ton.

To enable you to achieve greatest benefits, Republic offers you THREE different High Strength Steels—Republic ALDECOR, Republic COR-TEN and Republic DOUBLE STRENGTH in plates, sheets, strip and bars. And Republic metallurgists are ready to help you in selecting the steel best suited to your needs. Write us.

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GENERAL OFFICES • • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, New York

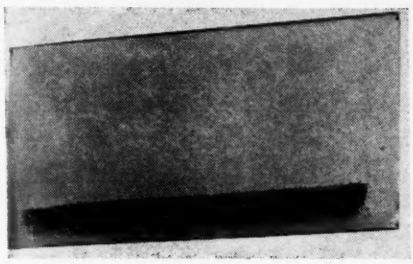
MID AMERICA EXPOSITION CLEVELAND

quickly adjusted by inserting bayonet plugs attached to the brazing leads into plainly marked receptacles. A foot switch with pilot cable serves as the primary control switch. For use with air-cooled tongs, the new brazer is supplied with a handle for carrying. Cooling is by natural air circulation; air enters the bottom of the case and is expelled through louvered openings in the top.

•

Welding Lens

A new baked plastic lens coating from which smudge and smoke can be wiped with a damp cloth without affecting coating and which is said by its manufacturer to be considerably superior to previous types of coating for non-pit welding lenses has been developed by Eastern Equipment Co., Inc., Willow Grove, Pa. Illustration shows effects



of weld spatter on lens that was partly coated by this new process. Accumulation of spatter on uncoated section, it is said, would long since have made lens unusable, but coated section scarcely is affected. New lens is available for helmets and hand-shields and in 50-mm. size for goggles.

•

Breathing Apparatus

The new Scott Air-Pak, a type of breathing apparatus, is offered by the Scott Aviation Corp., Lancaster, N. Y., as an aid in fighting underground mine fires. It has cylinders containing compressed air that is fed to respirator masks in the quantity needed by the wearer.

DON'T MAKE THE MISTAKE OF THINKING ALL BEARING MATERIALS ARE ALIKE

As specialists we offer a specific formula designed for each application and thus can give you a money-back guarantee of longer service and lower maintenance cost. Experienced Promet representatives are ready to help you with your maintenance problems day or night.

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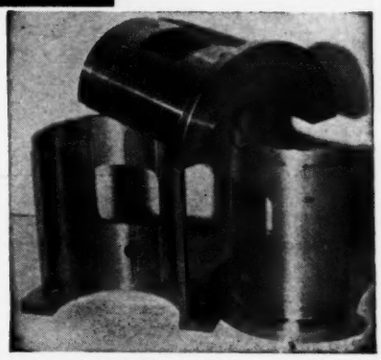
BRONZE AXLE BEARINGS JOURNAL LINERS BUSHINGS and WEARING PARTS for all coal mining equipment

GENERAL ELECTRIC • JOY • WESTINGHOUSE • GOODMAN • SULLIVAN • JEFFREY • OLDROYD



Round, hexagon, square bar stock. Rough cast, semi-finished. Cored stock all sizes (by ⅛" steps) from ½" minimum core to 12" O.D. and 12" lengths. 6 grades of hardness available.

Promet Bronze Castings to your patterns. Any size, shape or section, up to 3,000 lbs. each. Pattern making, designing and machining.

Promet Mine Special Babbitt. Lead base. All virgin metals, perfectly alloyed. Fine, velvety grain. Withstands heavy loads at high speeds and temperatures. The coefficient of friction is considerably less than that of tin babbitts, reducing power loss and wear. Entire bearing surface wears uniformly without pitting. Unaffected by moisture. Simply heat to 900° to 950° F. and pour. Can be remelted and reworked repeatedly. Repouring only refines it. No appreciable shrinkage, hence a better contact with supporting shell; a more solid, rigid bearing. Supplied in 10 lb. pigs.

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Drill Extractor

A new magnetic device for removing drill bits, diamond bits and broken drill rod from rock drillholes is offered by the Dings Magnetic Separator Co., Milwaukee. Made of a new type of Alnico magnet steel, the new unit is said by the manufacturer to be capable of lifting about 25 times its own weight in vertical lifts and exhibits unusual holding ability on small and uneven surfaces.

The Dings company reports that use of the extractor can often save redrilling holes in which drill bits have broken off or sec-

(*Continued on page 236*)

FOR LASTING

SAFETY

MINERS CHOOSE

The PORTABLE COOL CAP

Thousands of miners are still wearing Portable Cool Caps, purchased six to eight years ago. In addition to long life, safety and comfort, Cool Caps offer:

ONE PIECE MOLDED FIBER CROWN:
With Nine Arched Flutes to Increase Strength by at Least 50%.

PATENTED VENTILATION:
Keeps the Head Cooled to Mine Temperature.

TH FLEXO-BAND:
Assuring a Perfect Head Fit Without Pressure.

Cool Caps are available with or without lamp bracket or with special attachment for carbide lamps. Write or phone GR 1061.

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Safety Division

PORTABLE PRODUCTS CORPORATION

424 Blvd. of the Allies Pittsburgh, Pa.

One Best Permissible for Every Need

● Here is a simplified list of permissible explosives. From it you can choose the right one for every blasting requirement in coal mines.

The application of the proper permissible has enabled many operators to increase their tonnage and at the same time to get better breakage.

Hercules has long been a leader in developing improved permissibles, through exhaustive laboratory research and continuous study of field conditions, and will be glad to assist in selecting the right permissible for your requirements.

HERCULES PERMISSIBLES	
TYPE OF WORK	Approximate No. of 1¼" x 8" Cartridges per 100 lbs.
For Lump Coal	
Red H* C	276
Red H* D	316
Red H* F	356
For Rock or Fine Coal	
Red H* B	280
Collier* C	320
For Wet Work	
Hercogel* A	200
Hercogel* 2	240

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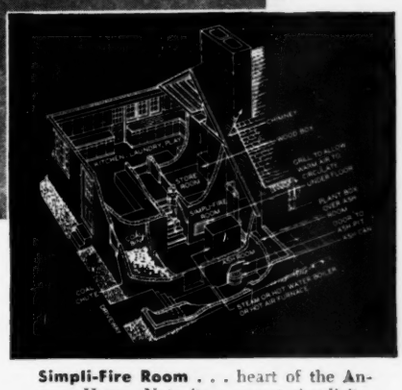

Simpli-Fire Room . . . heart of the Answer Home. Note its compact simplicity. See how simple it is to feed the heater . . . how ash shoveling has been eliminated!

Anthracite Simpli-Fire Room provides more house, more heat, for less money

TODAY . . . millions of prospective home owners—dozens in every community—are wondering how they are ever going to have homes of their own. Must they go on living with their in-laws the rest of their lives? Or must they accept some poorly heated, jerry-built shack?

"No," says Anthracite Institute. "Heat is needed only part of the year even in anthracite areas. Money can be saved on a scientifically engineered anthracite heating arrangement, *used to buy more home.*"

Working on this basis, Chapman and Evans, small homes specialists, developed the Answer Home with the Simpli-Fire Room, specially adapted for economical anthracite heating.

To the anthracite dealer, this is one of the most important developments of recent years.

In the first place, it cuts building costs materially, creating business for architect and builder, thus uniting coal and building trades.

Second, the Simpli-Fire Room makes anthracite easier to use than anyone ever dreamed . . . helps hold old markets, builds new.

Plans for Answer Home No. 1 are ready for architects and builders . . . with *definitive drawings* explaining details for prospective home owners.

If you have not already received your copy, write for "More House for Less Money," a 16-page brochure, showing Answer Homes Nos. 1, 2 and 3 with floor plans. Use coupon below.

For FREE Plans of this Answer Home—and others—fill out—mail coupon today.

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Department 53
101 Park Avenue, New York City

Please send me free of charge my copy of "More House for Less Money."

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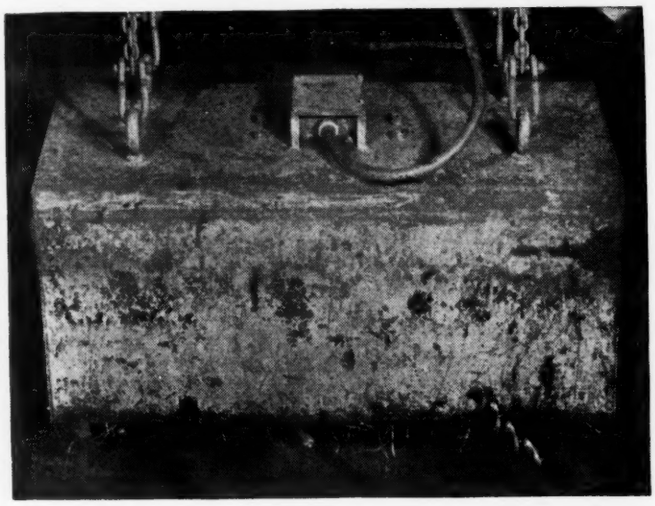
ANTHRACITE INSTITUTE

MAGNETS are PROFITABLE AT ISLAND CREEK COAL Company



One of the Stearns Magnets being profitably used by Island Creek Coal Co. and about which Mr. Carris writes.

Read what
E. C. Carris,
Director of Preparation
HAS TO SAY:

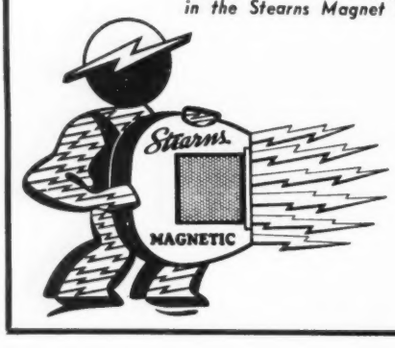
"Several months ago we installed one of your RECTANGULAR SUSPENDED MAGNETS ahead of one of our Launder Baum Jig combination washers and have found this magnet installation not only satisfactory in removing tramp iron from the raw coal, but it has been highly profitable in the salvaging of material which can be readily returned to the mines and reused.

"We are so enthusiastic over the performance of this magnet that we have purchased six more for delivery in the near future.

"You may be interested also to know that these magnets will replace other type magnets manufactured by other concerns."

Stearns Magnets are designed in all practicable sizes and shapes to suit your application whether it be for lifting or suspended separation purposes. If you want a dependable, powerful magnet, consult Stearns Magnetic Milwaukee.

** Mr. Carris is at the Holden, W. Va. works and tells us his plants are open for inspection at any time. Ask for the mine superintendent and say you are interested in the Stearns Magnet installation.*



Stearns

SEPARATORS • ROLLS • DRUMS
CLUTCHES • BRAKES • SPECIAL
MAGNETS • PULLEYS

MAGNETIC MFG. CO.

661 S. 28th St., Milwaukee 4, Wis.

Meet the "IRON QUINTS"

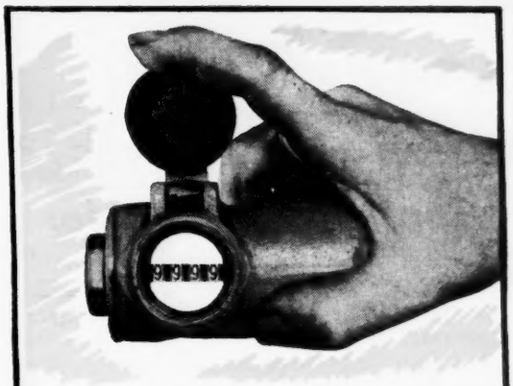
FIVE "Caterpillar" Diesel D8 Tractors started stripping anthracite coal at Plymouth, Pennsylvania, in the fall and winter of 1941. Up to March 15, 1946, the work records of the five machines, taken direct from their hour-meters, were as follows:

D8	1H9384	21,159 hours
D8	1H9236	21,733 hours
D8	1H9930	20,936 hours
D8	8R134	20,717 hours
D8	1H9730	22,485 hours

That adds up to a total of 107,030 hours of the toughest kind of work—ripping and bulldozing rocky overburden—loading and hauling 30-yard scrapers—climbing stiff grades—running in gritty mud and on slippery shale. Together, at a low estimate, the five units have moved 5,000,000 yards of earth and rock!

In the words of Paul Goddard, General Superintendent for Carey, Baxter & Kennedy, Inc., the owners—*"There's just nothing to compare a D8 with!"*

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS



Why does "Caterpillar" put an hour-meter on all its engines? Because the men who build those "Caterpillar" Diesels are willing to back the long life of their product against all comers.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

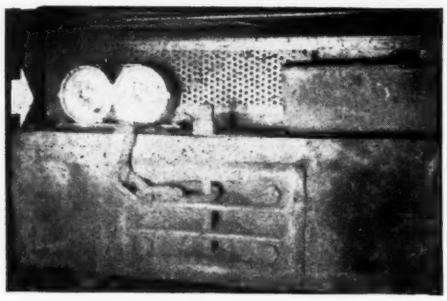
ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Semi-Trailer Dump Units

——TRUCK Engineering Corporation
CLEVELAND 2, OHIO

We can supply these models in various sizes up to 20 ton capacity — suitable for strip mine or highway hauling operations. Write for detailed information.

Twinlite
LOCOMOTIVE HEADLIGHTS



Continuous light for greater safety

• Serious accidents can result from moving trips when headlights fail on your locomotives. TWINLITE prevents such accidents because these headlights automatically switch over to battery power on failure of primary power source. Should one light burn out it has no effect on the other light.

Low voltage allows heavier filaments to better withstand the heavy duty requirements in the mine. Balanced 6-12 volt system thru a battery charged directly from the trolley reduces filament replacement costs. TWINLITE has all the features of the most modern automobile headlights. Mountings vary with locomotive. Lights can be separated. Designed with sealed beam lamps built by General Electric.

Write today for complete details.

See page 228 in Mining Catalogs

W. M. HALES COMPANY
Manufacturers of Replacement Parts for
COAL CUTTING MACHINES . . . LOCOMOTIVES . . . LOADING MACHINES
MINE EQUIPMENT AND SUPPLIES
Chicago Office
Telephone — Polk 3595
Factory
DANVILLE, ILL.
Telephone — Main 2298

tions of drill rod been lost. The extractor, it is said, weighs only 1 lb. and is made in 1¼- and 1½-in. diameters. In use it is fastened to the face of an old drill bit and put into the drillhole at the end of a length of drill rod or wooden pole.

•

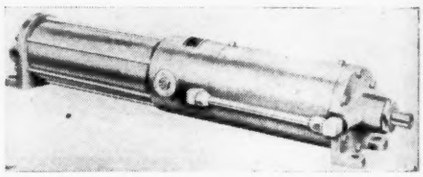
Welding Rod

A new flux-coated bronze welding rod for application by the oxyacetylene process has been developed by the Linde Air Products Co., 30 East 42d St., New York City, Known as Oxweld No. 25M patented flux-coated bronze rod, according to the manufacturer, it is precoated with flux in proportion to its size. This coating consists of Brazo flux plus a non-active binder that adheres firmly to the rod, melting down into the molten puddle without burning off ahead of the rod. The rod, it is said, can be heated and bent without destroying the coating; in addition the coating is not affected by weather conditions.

•

Air-Control Cylinders

Fast-acting economical operation by air is combined with smooth uniform controlled hydraulic-type regulation in its new double-acting Air-Draulic cylinders, according to the Logansport Machine Co., Logansport, Ind. Basically, the new Air-Draulic cylinders are air cylinders and may be utilized



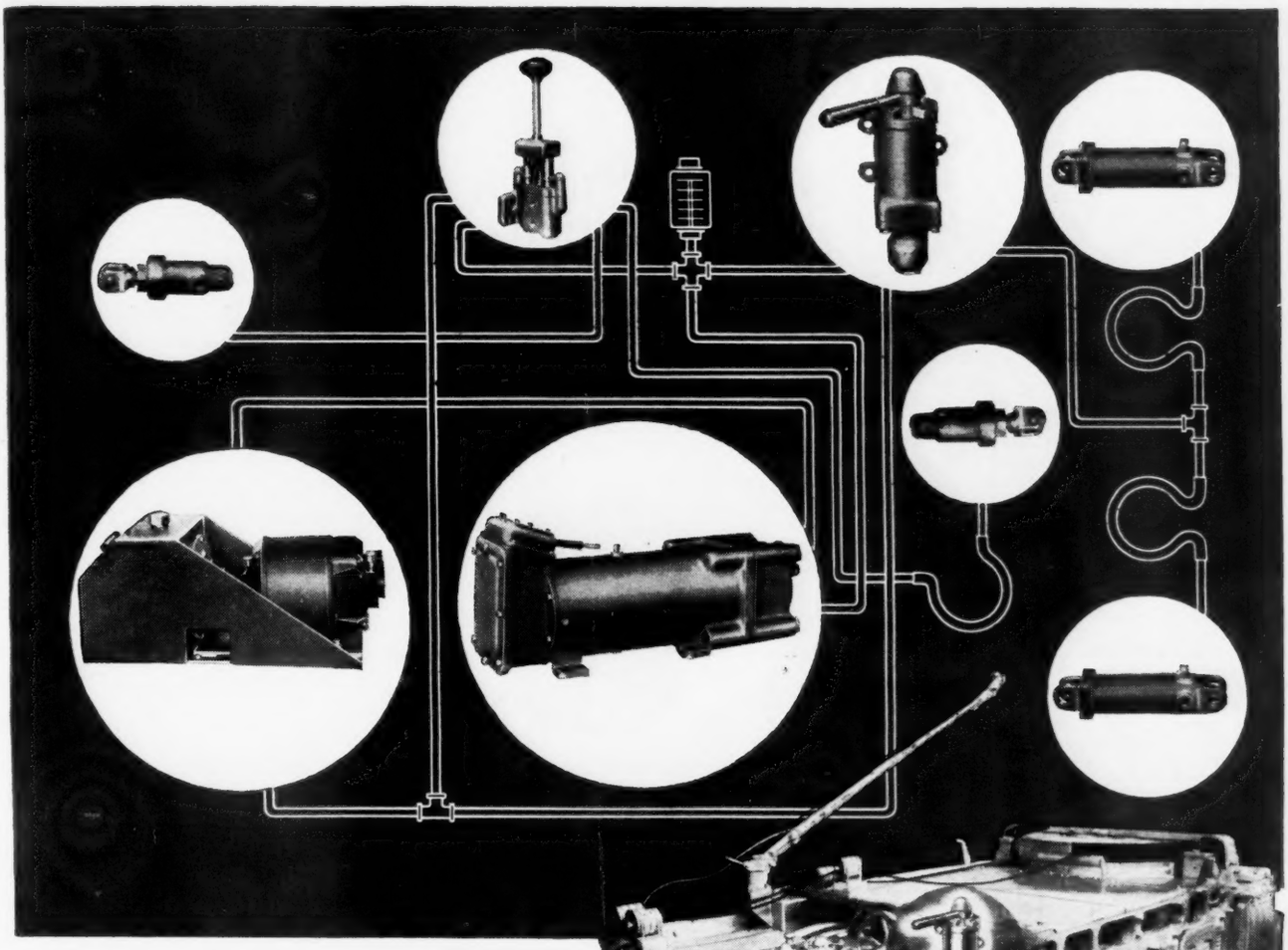
wherever compressed air is available. Yet they provide the smooth accurately controlled feed regulation which is normally obtained only in hydraulic cylinders, the company states.

Air-Draulic cylinders are made with separate air and hydraulic pistons assembled as an integral unit on a common piston rod. Rod movements are powered by the air cylinder, which may be controlled by any type of four-way air valve. They can be furnished for controlled feed with rapid return in either or both directions. Five standard mounting types are offered and they are available in four standard sizes from 3-in. to 8-in. bore with any length of stroke to 5 ft. The air piston is built for operation at pressures to 150 lb. per square inch. Catalog 471, illustrating and describing the cylinders in detail, is available on request from the manufacturer.

•

Calcium Hypochlorite

A new high-test calcium hypochlorite, containing a minimum of 70 percent available chlorine, is now available for civilian uses, marketed under the trade name "Pittchlor," according to an announcement by the Columbia Chemical Division of the Pittsburgh Plate Glass Co., Pittsburgh, Pa.



Here are the Brakes You need to *Step-Up*

HAULAGE EFFICIENCY

Every improvement in *mining* efficiency that increases output calls for an increase in *haulage* efficiency to move the tonnage from face to tipple.

Your present haulage equipment can probably do the job, if you increase average speeds and boost availability with modern brakes.

With Westinghouse Hydraulic Brakes, trips can move faster . . . for the motorman knows he can *stop* faster. Cars can be spotted more quickly and accurately. Equipment damage due to motor bucking is greatly reduced; fewer split pinions, broken axles and armature caps, less damage to coils and insulation, less burning of fingers and contact tips. On tandem hook-ups, the brakes give simultaneous control of both locomotives, and utilize the combined weight in slowing or stopping.

Rugged and compact, these brakes can be installed when your locomotives are in the shop for overhaul. We'd like to quote on your requirements. Please submit the information indicated at right.

INFORMATION FOR QUOTATION

1. Make, model or class of locomotive.
2. Weight.
3. Type of service.
4. Sketch showing overall dimensions.
5. Track gage.
6. Sketch showing arrangement of brake rigging and dimensions of levers.
7. Current supply to oil pump motor: (a) trolley or battery? (b) Nominal, minimum or maximum voltage.
8. Hydraulic sanding required?
9. Single or tandem operation?
10. If tandem (a) permanent or intermittent? (b) one or two control stations? (c) all equipment on one locomotive? (d) 4 point or 2 point sanding?

WESTINGHOUSE AIR BRAKE COMPANY

INDUSTRIAL DIVISION WILMERDING, PA.

Investigate

this MODERN Core-Drilling Machine

It's Engineered to Meet Your Most Severe Demands

Sprague & Henwood Core Drilling Machines are modern in every respect . . . Can EASILY perform the work expected of them! That's because they are built to meet the demands of present day core drilling work! The machines are high speed, exceptionally sturdy, constructed to withstand rugged service. Available with two distinct types of feeds. "Screwfeed" and "Hydraulic," according to the type of swivel head selected. Have many exclusive features. Write today for full details.

Bortz DIAMOND BITS are also manufactured by Sprague & Henwood. Full details sent upon request.

SPRAGUE & HENWOOD, INC.

Dept. K **SCRANTON, PA., U. S. A.**

ACME *mine car* COMPRESSOR

This mobile unit only 127 inches long—weighing only 3510 pounds each—and provided with coupling for towing—delivers 92 cu. ft. of air per minute at 100 lbs. pressure.

Designed especially for mine use, it is adaptable to both high and low seam operations—only 27½" high—particularly mechanized mining.

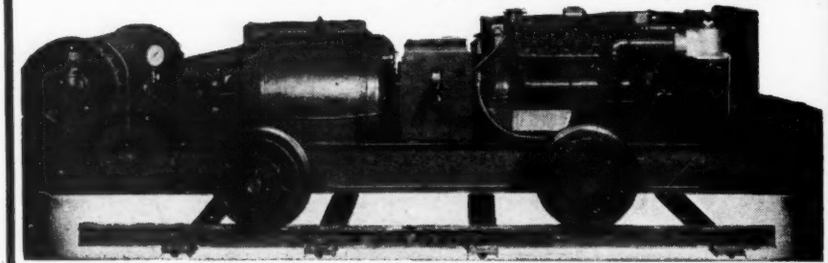
The car is equipped with one floating and two stub axles eliminating danger of derailment. Furnished in track gauges from 36" to 56".

The "Lowboy" Model 110 shown offers the latest in mine car compressors—sturdily built—efficient—economical to operate.

WRITE FOR BULLETIN 3920

This bulletin shows how well the "Lowboy" is built—details of construction—illustrates sturdy frame design and gives complete specifications. *Write for yours today.*

Light Weight Low Height **Compact Mobile**



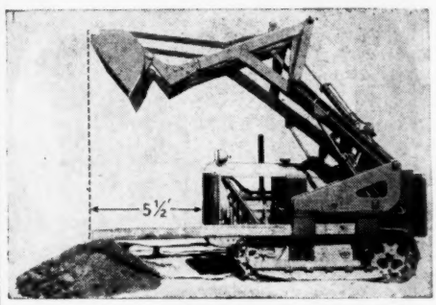
ACME COMPRESSOR CO.
Williamson, West Virginia

It is said to have special advantages for the chlorination of water supplies up to approximately 500,000 gal. per day or where the daily requirement of available chlorine is about 1 lb. For continuous treatment, it can be used with dry feeding devices or it can be dissolved in water and fed through a solution feeder.

•

Tractor Loader

A new front-end tractor loader with a high lift and reach is now being manufactured by Drott Mfg. Corp., 5141 North 35 St., Milwaukee 9, Wis.—formerly Hi-Way Service Corp. Designed for mounting on Oliver Cletrac crawler tractors, the Drott Hi Lift loader, according to the manufacturer, has cut loading cost of material handling on various operations—from digging basements and loading loose materials to stripping coal and excavating hard clay. It has an unusual high lift of approximately 10 ft. 8 in. and dumps its load about 5 ft. ahead of the radiator, said to be a definite advantage for loading trucks and other vehicles. The standard bucket has a capacity of 1¼ cu.yd. A light-material-handling shovel of 1¾ cu.yd. is available for handling coal and other light materials.



The unit is hydraulically operated and the shovel bucket is regulated by the operator—either up or down, loaded or empty—by finger-tip controls while the tractor is in motion or standing still.

•

Gas-Drive Welder

Hobart Brothers Co., Troy, Ohio, has developed a two-operator gasoline-engine-driven arc welder by placing two of its 300-amp. generators on a common shaft supplied with separate exitation from a common exciter. This double unit is directly connected to an eight-cylinder Chrysler industrial engine. Two operators can work independently of each other, since the engine is governed to maintain constant speed for all loads. A paralleling switch also is provided to turn the unit effectively into a single-operator 600-amp. unit.

•

Radial Saw

A new lightweight portable 12-in. radial saw, which it is said will save 25 percent or more of the usual power-saw time on the average industrial or other production cutting job, has been added to the Monarch Uni-Point line of woodworking machinery

EUCLIDS have the Backbone to take it

A FRAME OF UNMATCHED STRENGTH

● Hauling equipment used in off-the-highway work must be designed and built to move large loads over difficult haul roads at low cost. It must have rugged "staying power" for the hard usage and varying conditions of mining, construction and quarry operations.

The strong, rigid frame is the backbone of the Rear-Dump Euclid, the hauling unit that has proved its dependable, low cost performance on hundreds of the toughest jobs. Constructed of wide-flanged, deep sectioned "I" beams stiffened by large tubular and box section torque members, the Euclid frame is built to last for the life of the truck. The body is cushioned on large rubber support pads which absorb the heavy impacts of loading and hauling over rough roads . . . there is no metal to metal contact between the body and frame.

Ask your Distributor to show you how all Euclid models, Rear-Dump and Bottom-Dump, are built *throughout* for long lasting, efficient off-the-highway service.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

(1) Heavy steel "I" beams (2) large tubular torque members (3) Box section front torque member (4) Body support pads (5) Rubber-mounted pivot shaft bushings.

EUCLIDS *Move the Earth*

Better build-ups

...with COATED STOODY MANGANESE

An Improved Welding Electrode for Use on All Manganese Steel Equipment

For rebuilding worn equipment, you can't beat the new Stoody Coated Manganese. It's the one electrode that has a safety factor in manganese content. You see, usual manganese electrodes are drawn. Work-hardening characteristics in the drawing process limit the percentage of manganese that can be included. *By tightly rolling alloying elements in tubes, Stoody avoids all work-hardening problems!* An abundance of manganese is included, which allows for burn-out loss and still leaves more than the 11 per cent minimum necessary for strong, tough deposits. Thus, by using Coated Stoody Manganese, risk of brittle deposits due to insufficient manganese is completely eliminated.

Coated Stoody Manganese gives you a fast burn-off rate, low spatter loss, low penetration and high build-ups. Slag is easily removed immediately after welding and the electrodes can be applied with either A.C. or D.C. machines. PRICE?...Much lower than competitive brands of manganese! 3/16" and 1/4" rod sizes cost only 40¢ per lb., f. o. b. Whittier, Calif., or distributor's warehouse. Discounts on quantity orders. Buy 50 lbs. today and make a test on your next job!

For maximum life on all wearing manganese parts, always hard-face surfaces with STOODY SELF-HARDENING, the long-wearing, impact resisting alloy for all heavy equipment.

STOODY COMPANY

1143 West Slauson Ave. • Whittier, California

STOODY HARD-FACING ALLOYS
Retard Wear — Save Repair

by the American Saw Mill Machinery Co., Hackettstown, N. J.

The new saw is made prinicpally of light-non-rusting magnesium, so that the unit complete with carrying frame and 1½-hp. electric motor weighs about 200 lb. and can be carried readily by two men. It has a 3x16-in. crosscut and 20½-in.-wide ripping capacity, and it will handle all the different kinds of work that heavy stationary radial saws will do.

•

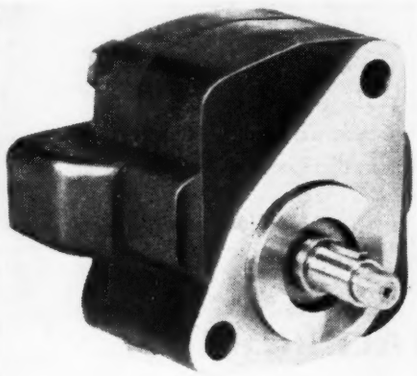
Concrete Mixer

A new 11-S Kwik-Mix Dandie concrete mixer offered by the Kwik-Mix Co., Port Washington, Wis., completes the entirely redesigned line, which also includes new 6-S and 16-S sizes. The 11-S follows the general design of the previously announced Dandie mixers, including tilted flow-line discharge chute, selective skip shaker and re-mixing drum. High-strength steel is used at all points of wear. The 11-S has a rated capacity of 11 cu. ft. of mixed concrete plus 10 percent and complies with A.G.C. specifications.

•

Hydraulic Pump

A new gear-type hydraulic pump, Model H657-A, is announced by the Aro Equipment Corp., Bryan, Ohio. The unit delivers pressure up to 2,000 lb. per square inch, with 5½ g.p.m. at 2,800 r.p.m. Vol-



umetric efficiency using S.A.E. No. 10 oil is above 90 percent and over-all efficiency above 500-lb. pressure is stated to be 85 percent or better. It is suitable for hydraulic systems ranging from 100 to 2,000 lb., such as hydraulic presses, machine-tool feed controls, hydraulic jacks, bulldozer blade control, road machinery control and other uses. The unit is approximately a 3½-in. cube, with ½-in. dia. x 1/16-in. drive shaft extension, plus threaded portion for ⅜-in. nut.

•

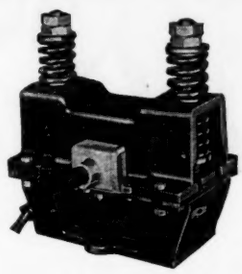
Scrapers

R. G. LeTourneau, Inc., Peoria, Ill., is equipping its Tournapull-drawn LP Carryall scrapers with 21.00x24 instead of 18.00x24 tires. According to the manufacturer, maximum loads can now be transported with lower pressure in the tires; scraper clearance has been increased, and other advantages have resulted that will mean more efficient operation, less maintenance and better performance.

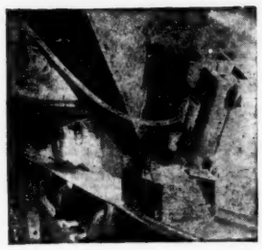
SYNTRON

"Pulsating Magnet"

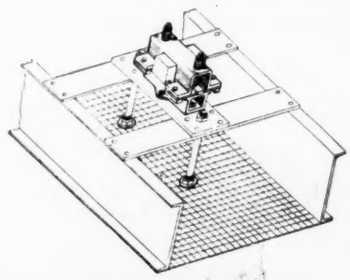
ELECTRIC VIBRATORS



Assure FREE-FLOWING Coal Bins, Bunkers & Chutes



LIVEN-UP Screening Areas



3600 POWERFUL, CONTROLLED

Vibrations per minute break down "arching" and "plugging."

Eliminate pounding, poking and prodding.

SAVE TIME AND LABOR

Write for illustrated folder.

SYNTRON CO.

975 Lexington, Homer City, Pa.

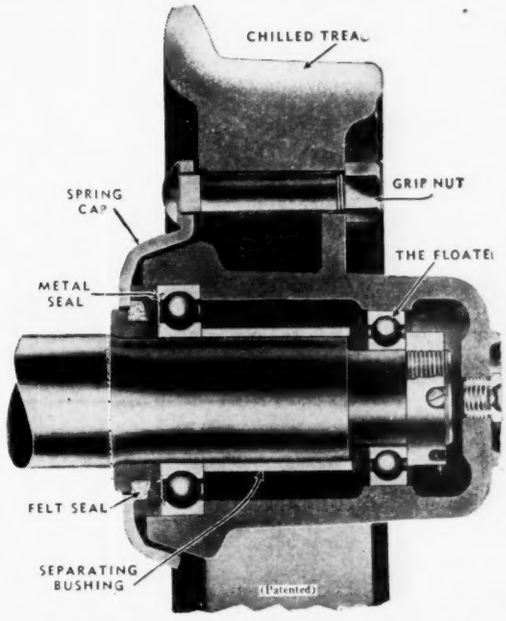
—only the better managed mines use this wheel!

Operators who check operating costs most carefully . . . who check wheel maintenance costs regularly, are our best customers on S-D "Floater" Ball Bearing Wheels. We've found that the better managed mines are always looking for improvements that mean lower costs, and S-D "Floater" wheels cut wheel maintenance costs tremendously.

In many mines, wheels and trucks have been an orphan child, so to speak. And, with so little attention given to their vital importance, they have become costly items—retarding output, wasting grease, labor and power.

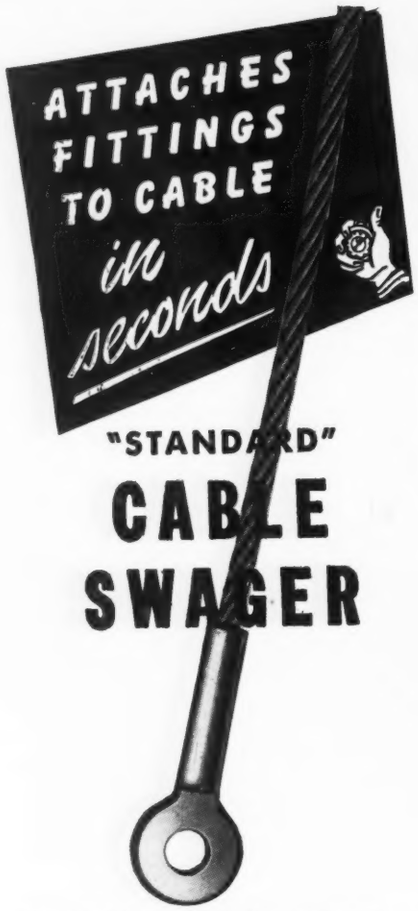
If you are not using S-D "Floater" Ball Bearing Wheels, you may, unknowingly, have a big profit leak in your wheels. For, engineers' tests have proved that your locomotives can handle almost 50 per cent more load when the cars are equipped with S-D "Floaters" than when equipped with wheels having other types of precision bearings. Furthermore, your cost of greasing will be held to that of one greasing in 5 years, and wheel castings and bearings are guaranteed for 5 years against breakage, excessive wear or failure.

Don't wait any longer to check your wheels. They may be costing you plenty.



You can test S-D "Floaters" for yourself on our FREE TRIAL PLAN. Write to us now.

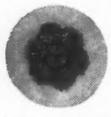
Sanford-Day Iron Works, Knoxville 9, Tennessee



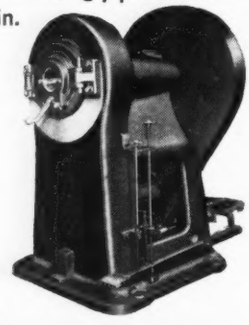
"STANDARD"
CABLE
SWAGER

"STANDARD" swaged connections are rugged and exceed the tensile strength of the cable itself. A single operator, without special skill, can attach fittings perfectly in a few seconds. Swaged fittings have a smooth surface and are attached so firmly that fitting and cable strands are locked together.

Four sizes of "Standard" Cable Swaging Machines are available with automatic die opener and automatic feed for cables from 1/16" to 1½". Any fitting design can be readily accommodated. In operation, this machine is safe, simple and amazingly productive. Write for bulletin.



Fitting and cable are locked together



"Standard" Cable Swager

Our new 26 minute sound film (16 mm) shows swagers in operation. Write for available film dates.

STANDARD MACHINERY CO.
1535 Elmwood Ave., Providence 1, R. I.

Industrial Notes

OHIO BRASS CO., Mansfield, Ohio, has announced that T. J. Harris, recently released from the Navy, has returned to the company in charge of its Kentucky, Tennessee and Virginia mining territory. He handled this district from 1941 until he left for the service in 1944.

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J., has appointed Andrew S. Ormsby, formerly in charge of industrial relations for the Bendix Aviation Co., as director of industrial relations.

WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL & IRON CORP., New York, has appointed Harry Bottomley, recently returned from military service, sales representative in its southern Pennsylvania and Virginia territory, succeeding H. C. Stults, resigned.

TIMKEN ROLLER BEARING CO., Canton, Ohio, has announced the following appointments: Walter F. Green has been promoted to assistant manager of the company's division of research and development. Joseph M. Roshong has been named superintendent of the division of research and development, and Harley J. Urbach has been appointed works engineer, succeeding Mr. Green. F. R. MacFayden has been transferred from the Milwaukee office to the Canton engineering department as industrial engineer, in which capacity he will act as assistant to S. M. Weckstein and Paul Haager.

THERMOID CO., Trenton, N. J., announces the appointment of H. C. Anderson as director of research. Mr. Anderson was formerly with the Flintkote Co., Chrysler Corp., and Ford Motor Co., respectively, in research, engineering, and managerial capacities.

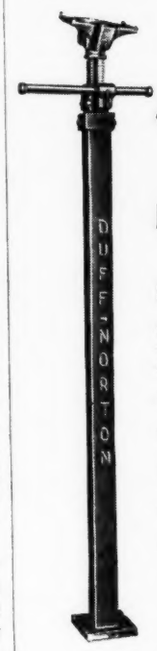
AMERICAN BRATTICE CLOTH CORP., Warsaw, Ind., has appointed D. W. Marshall, formerly in charge of ventilation tubing sales for Bemis Bro. Bag Co., as sales manager. Leonard E. Schaeffer, formerly with the Upson-Walton Co., Cleveland, has been named to represent the company in Ohio and Pennsylvania.

AMERICAN CAR & FOUNDRY CO., New York, has elected R. A. Williams a director to succeed W. L. Stancliffe, recently resigned. Mr. Williams has been vice president of sales for the company since 1943, and also is executive vice president and a director of the American Car & Foundry Export Co.

AMERICAN HOIST & DERRICK CO. has placed Raymond J. Dervey, recently released from the army as a major, in charge of its Pittsburgh office, relieving Ralph Thomson, who has been made manager of the New York office. Previous to the war, Mr. Dervey served in various engineering capacities with the Amerada Petroleum Corp., the Carnegie Illinois Steel Corp., and the J. T. Ryerson & Sons Co. Mr. Thomson has represented American Hoist through the Pittsburgh office for many years.

HENDRICK MFG. CO., Carbondale, Pa., has appointed as sales representatives, Charles H. Dishman, Porter Bldg., Kansas City, Mo., to handle Kansas, Oklahoma and western Missouri; and Crandall-Ricker Sales Corp., Paul Brown Bldg., St. Louis, for eastern Missouri, Arkansas, western Tennessee,

TAKE YOUR CHOICE
from the 2 types of
DUFF-NORTON
MINE ROOF JACKS



STANDARD
DUFF-NORTON
MINE ROOF JACK

Strong, safe, quick operating; made in two capacities—8 and 16 tons; heights from 30 to 72 inches, with a raise of 17 inches. Available with variety of head and handle styles.

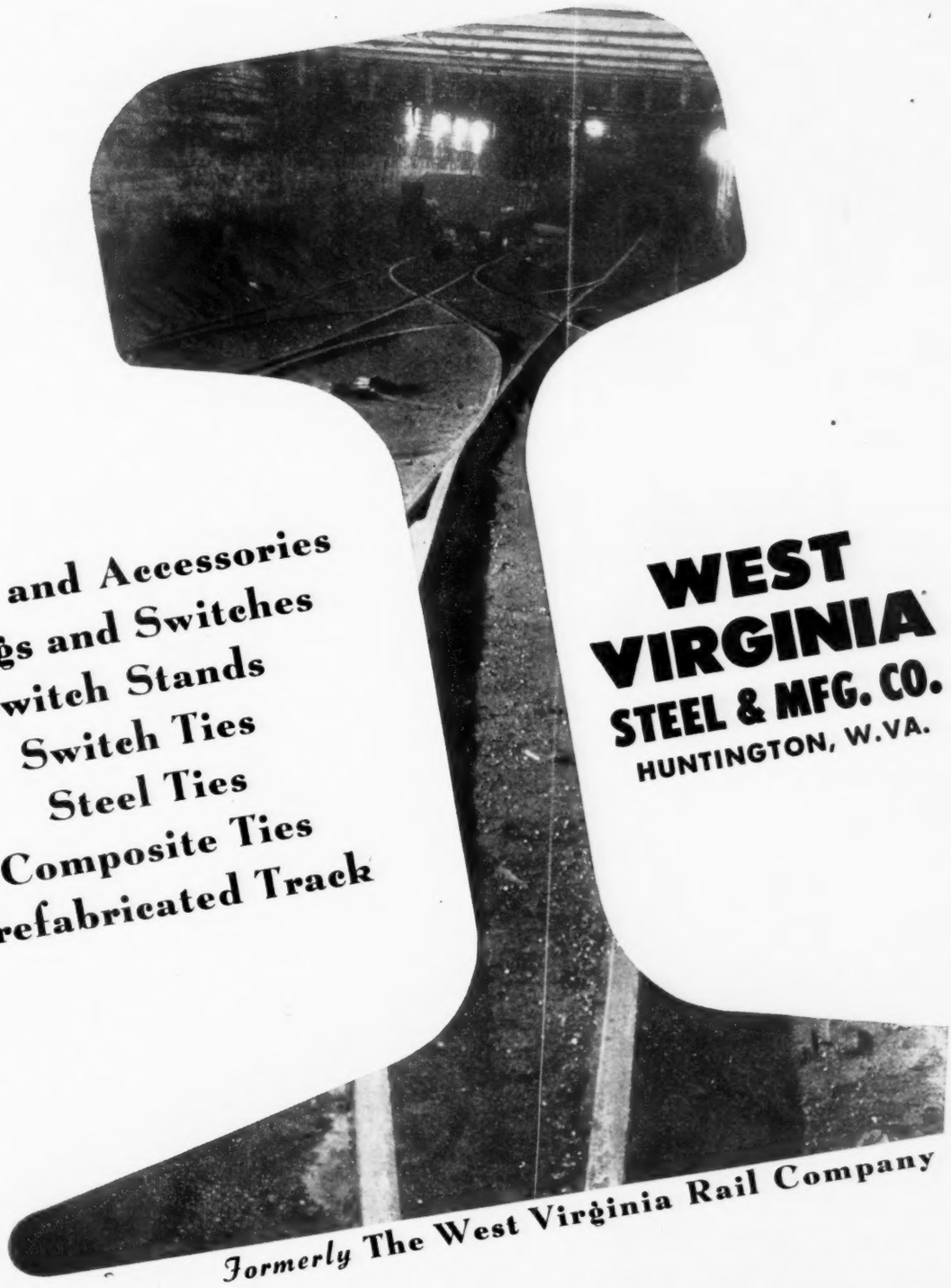
TAILOR-MADE
DUFF-NORTON
MINE ROOF
JACK FITTINGS

You buy only the base and screw fittings, cutting your own 2 inch pipe to the height you need. Fittings are quickly and easily attached to pipe columns. Can be used over and over. Two capacities—8 and 16 tons.

Write for bulletins on both types of Duff-Norton Mine Roof Jacks.

THE DUFF-NORTON
MANUFACTURING CO.
PITTSBURGH, PA.
Canadian Plant:
COATICOOK, QUE
There is a Distributor Near You

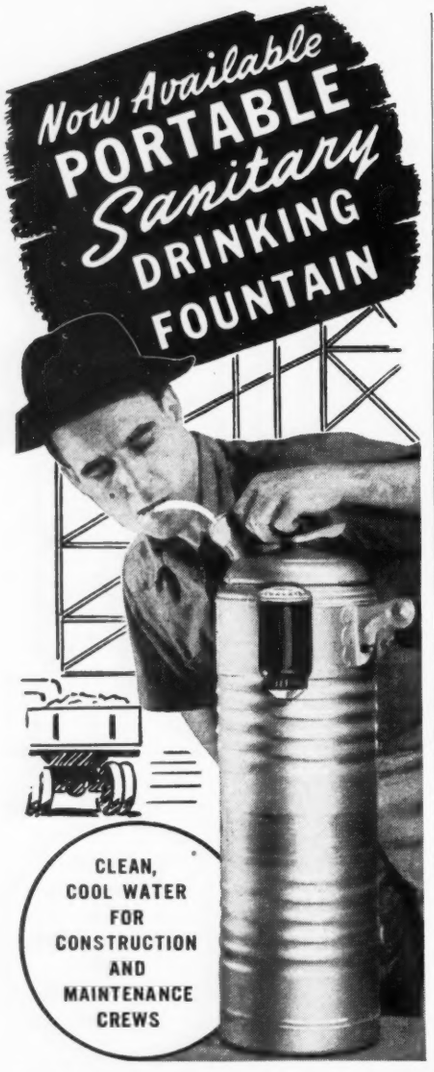
Everything IN TRACKWORK



Rails and Accessories
Frogs and Switches
Switch Stands
Switch Ties
Steel Ties
Composite Ties
Prefabricated Track

WEST VIRGINIA STEEL & MFG. CO.
HUNTINGTON, W.VA.

Formerly The West Virginia Rail Company



STOP GERM SPREADING PRACTICES!

Eliminate the use of unsanitary pails, kegs, dippers or cups, and protect the health and strength of your workmen on jobs where *fresh*, *clean* and *cool* drinking water is not permanently available . . . Save payroll losses by keeping your men on the job! The Dobbins Portable Drinking Fountain does all this by providing protection from disease, colds, etc., which may otherwise be spread with the use of a "common" drinking cup or dipper. Inner water container and bubbler parts made of corrosion-proof stainless steel or plated brass. Fully insulated to keep water *fresh* and *cool*. Four gallon capacity. A few strokes with the pump supplies compressed air for instant flow of water at the press of a button. Meets requirements of Public Health Authorities!

ORDER DIRECT FROM FACTORY—IMMEDIATE DELIVERY

No. 18—*Dobbins Superbilt Portable Drinking Fountain,* less carrying strap and salt dispenser, **Only $12.50**
Salt Tablet Dispenser, 500 tablet capacity, extra **$2.75**
Adjustable, Waterproof Carrying Strap, extra.. **$1.00**
Spill Cup, to catch overflow when used indoors.. **$3.50**
Mounting Bracket, holds fountain to wall or floor of buildings, trucks, tractors, locomotive cabs, etc. **$4.50**

All prices F.O.B. Elkhart, Indiana. Circular on request.

DOBBINS MANUFACTURING COMPANY
Dept. 525 Elkhart, Indiana

Dobbins Superbilt PORTABLE DRINKING FOUNTAIN

western Kentucky, and a portion of southwestern Illinois. Robert F. Couch, who was associated with the company from 1936 until he entered the army in 1942, has returned as assistant to Trowbridge A. Warner, sales manager.

RELIANCE ELECTRIC & ENG. CO., Cleveland, has appointed William G. Hall, formerly in charge of renewal parts and repairs, as manager of a combined renewal-parts and service division, succeeding Arthur W. Ray, who retires after completing 40 years with Reliance, the past 21 of them as service manager.

UNITED STATES RUBBER CO., New York, has appointed Frank M. Urban merchandise manager of its mechanical goods division. He had been assistant merchandise manager since 1944.

FOOTE BROS. GEAR AND MACHINE CORP. has appointed Charles U. S. Grant, recently released from the Navy, sales engineer in its Cleveland office.

CATERPILLAR TRACTOR CO., Peoria, Ill., has announced plans for the enlargement of the floor area of its Peoria plant by nearly 50 percent, the largest expansion program in the history of the company. Scheduled to be carried out progressively so that production can be increased as soon as possible, the expansion is expected to permit manufacture of more tractors by September of this year. Final completion, which will add approximately 180,000,000 sq. ft. of floor space —about 41 acres—to the plant, is expected for the summer of 1948, and will provide a new factory for the manufacture of diesel engines, as well as expanded facilities for other products and activities.

ELASTIC STOP NUT CORP. OF AMERICA, Union, N. J., has elected Charles E. Heintz, general sales manager for the past two years, vice president in charge of sales.

S. P. KINNEY ENGINEERS, INC., Pittsburgh, has appointed Watson & Watson, 408 West Clinch St., Knoxville, Tenn., agents for the Brassert automatic self-cleaning water strainer in the eastern Tennessee district.

CINCH MFG. CORP., Chicago, has announced the purchase of the Howard B. Jones Co., manufacturers of electrical connecting devices. Cary Wilson, vice president, is general manager of the new organization, which will be known as the Howard B. Jones Division.

GENERAL ELECTRIC CO., Bridgeport, Conn., has named R. E. Joines, formerly New Orleans representative, as acting manager of construction materials sales in the southeastern district, with headquarters in Atlanta. General Electric also has announced the following appointments as district representatives for construction material sales: W. W. Bryan, Arnold Jensen, and H. J. Kowal, all with the company previous to service with the armed forces, have been assigned to the Philadelphia territory. Robert Farian has been assigned to the Chicago area, and R. C. Holmquist, recently returned after service as lieutenant in the army, to Denver, Colo. R. O. Snyder, returning from service in the Navy as a lieutenant (j.g.), has been appointed to the post in St. Louis. R. A. Cochran, who returned recently after service as a lieutenant colonel in the army, has been assigned to Nashville, Tenn.

GARDNER-DENVER CO., Quincy, Ill., has

FOR SAFETY'S SAKE, SUPERIOR COUPLINGS

Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH KNIFE & FORGE CO.
1421 Reedsdale St., N.S.
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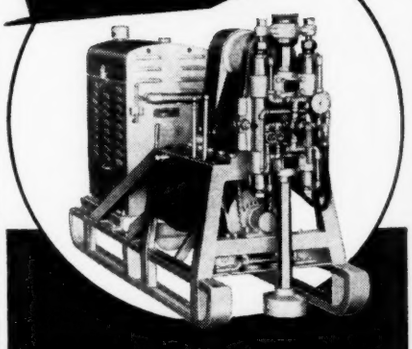
Diamond Core Drilling
CONTRACTORS



Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. We mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

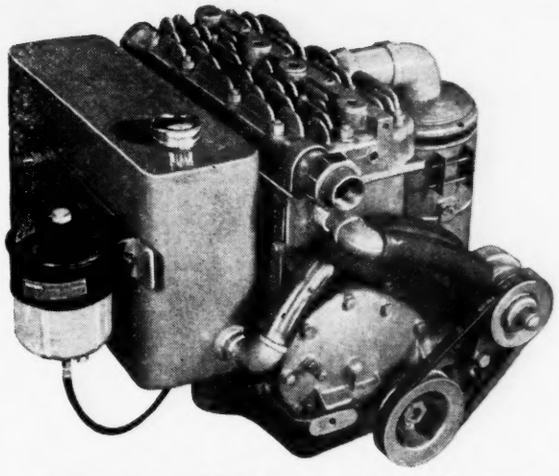
MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

IT ONLY COSTS YOU $7.00 A MONTH TO WEAR IT OUT EVERY YEAR!

In any compressor outfit, it's always the compressor unit itself that bears the brunt of wear and tear and demands repair.

One of the outstanding, low-operating-cost advantages of a Cantrell air compressor is the Cantrell Factory Rebuilt compressor exchange plan. This exclusive plan permits you to replace your Cantrell compressor unit annually, if necessary, at only a fraction over $7.00 per month. At this low cost, you can use this plan to advantage by simply ordering a replacement compressor, when needed, make the change over, within an hour, and return old unit for credit.

Whether it's for track or trackless mining, there's a Cantrell compressor, among our five models, to meet every mining requirement.

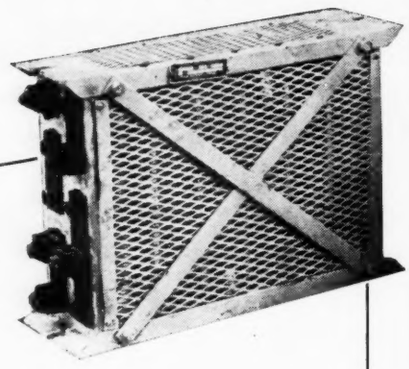


★ *This Cantrell S-101 Compressor Assembly serves all Cantrell outfits. Sold separately as shown above for only $348.00 F.O.B. Plant.*

Cantrell COMPRESSORS

IMPERIAL-CANTRELL MFG., CO. JELLICO, TENNESSEE

An external frame, supporting the helical coils in G. M. C. Resistances prevents damage due to jolts and vibration . . . thus insuring longer useful life. Added protection includes a shield to protect coils from outside injury. The coils are highly resistant to damage from mine water and mill fumes. Insulators are of a type not affected by sudden changes in temperature. For a really sturdy resistance unit, choose G. M. C.!



Protected Construction lets G. M. C. Resistances do a better job, longer!

Guyan Machinery Company
Logan, West Virginia

FLEXIPIPE
The improved flexible tubing for mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by a more rigid means of face ventilation.

Write for free sample and full information.

BEMIS BRO. BAG CO.
412 Poplar Street, St. Louis 2, Mo.

announced the return of B. P. Spann as advertising manager, after 38 months' service in the Navy. Mr. Spann, who has been with the Gardner-Denver Company since 1934, was granted a leave of absence in November, 1942, to enter the Navy, and upon his release held the rank of lieutenant commander.

Caterpillar Tractor Co., Peoria, Ill., has named Cornell E. Jones, formerly a major in the Army Corps of Engineers, sales development manager. Previous to the war, Mr. Jones served with county and state highway departments, the J. D. Adams Co., and International Harvester Co. both in domestic and foreign operations.

Lincoln Engineering Co., St. Louis, Mo., has elected Jack L. Carmitcheal, formerly general sales manager, vice president in charge of sales.

R. G. Letourneau, Inc., Peoria, Ill., has announced the return of Dan K. Heiple, recently released from the Navy, as a field engineer in its installation department.

Robins Conveyors, Inc., Division of Hewitt Rubber Corp. has announced that R. W. Eichenberger, vice president, has moved to the Chicago office to supervise sales in the western division, succeeding J. F. Meissner, resigned. Mr. Eichenberger joined the Robins organization in 1910 and was recently in charge of engineering at the company's Passaic headquarters.

Marion Steam Shovel Co., Marion, Ohio, has announced a change in the firm name to the Marion Power Shovel Co. This change, the first in more than 60 years of operation, was taken, company officials stated, because for some years a large portion of its production has been diesel-, gasoline- and electric-powered machines and the new name better identifies the company's operations. An extensive modernization program is going forward under the direction of John M. Demarest, recently elected vice president and works manager, it was announced.

B. F. Goodrich Co., Akron, Ohio, has announced two changes in the field organization of its industrial products sales division. C. M. Christensen, Denver district manager since 1941, has been appointed special mining representative in the Rocky Mountain area. Col. John S. Gulledge, St. Louis district manager before he entered the service in 1942, has been named acting district manager at Denver.

Wheat Lamp Sales, Inc., Charleston, W. Va., has announced that it is expanding its operations to include the States of Illinois and Indiana and western Kentucky.

Ransome Machinery Co. has appointed Richard F. Garretson eastern regional manager of its industrial division in charge of sales of welding and work positioning equipment, with offices in Philadelphia.

Standard Oil Co. (Indiana) has announced the establishment of 22 graduate fellowships at 17 educational institutions, according to Dr. Robert E. Wilson, chairman of the board, who said the purpose of the program is "to provide 'seed corn' for future research." Fellowships in chemistry have been established at Northwestern, Illinois, Chicago, Wayne, Ohio State, Wisconsin, Iowa State and Johns Hopkins; in chemical engineering at Massachusetts Institute of Technology, Minnesota, Illinois, Cornell, Carnegie Tech and Princeton; in engineering at Michigan, Minnesota, Iowa, Illinois, Purdue and Illinois Institute of Technology; in civil engineering at Purdue; and in marketing and management at Northwestern. The fellowships will be awarded to students working for master's or doctor's degrees and will average approximately $1,500 a year.

Lincoln Engineering Co., Chicago, has announced that Capt. Morgan B. Lawton, who recently returned to the company after his army service, has been presented with the Legion of Merit Medal by Major Gen. Henry B. Sayler, deputy chief of Ordnance, at ceremonies held in the Pentagon Building, Washington. The award was given Capt. Lawton for his success in initiating and establishing a program of standardization and improvement of lubrication equipment which he headed during the war.

Davey Compressor Co., Kent, Ohio, has appointed J. T. Myers as assistant general manager. He recently returned to the company after service as a lieutenant in the Navy.

SKF Industries, Inc., Philadelphia, has announced appointment of new field representatives as follows: J. K. Redding, Philadelphia office; F. O. Hamlet, Chicago; G. E. Mayhew, Cleveland; and C. L. Eberlein, Atlanta.

John A. Roebling's Sons Co., Trenton, N. J., has appointed Fred J. Maple, formerly manager of advertising, as manager of exhibits. He will devote his entire time to this new department. Albert Neroni, formerly

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for your

COAL PRODUCTION

is our business

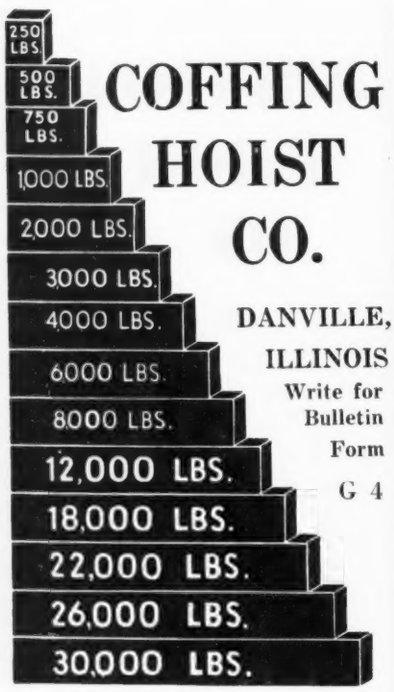
The efficient production of SALES is just as important to a profitable coal business as is low cost production. Intelligent and persistent offering of your coals in EVERY market where they can be BEST applied assures your running time and insures your profit. We welcome your inquiry.

THE CLEVELAND-CLIFFS IRON COMPANY

UNION COMMERCE BLDG. • CLEVELAND 14, OHIO

COFFING HOISTS

COFFING HOISTS are built in a wide range of capacities. The SAFETY-PULL Ratchet Lever Hoists come in capacities from ¾ to 15 tons. The QUIK-LIFT Electric Hoist is built in 28 different models with capacities ranging from 250 to 4000 pounds and the MODEL Y-C Spur Geared Hoist is built in seven capacities from ½ to 5 tons. As more materials become available more COFFING HOISTS will be built to meet your requirements. Contact your supplier for detailed information.



COFFING HOIST CO.

DANVILLE, ILLINOIS

Write for Bulletin Form G 4

assistant manager of advertising for Anaconda Wire & Cable Co., Inc., has been named to succeed Mr. Maple as manager of advertising.

American Car & Foundry Co., New York, has announced that it is extending its welding activities by establishing a welded-products division that will concentrate on the design, development and manufacture of weldments, with facilities and equipment for automatic and hand welding, heavy forming machinery, heat-treating and stress-relieving units, metallurgical and physical testings, X-ray and magnaflux inspecting equipment.

Denver Equipment Co., Denver, has elected T. S. Bailey Jr. a vice president. He has been associated with the company for 14 years and was sales manager prior to his new appointment.

Trade Literature

Mine Locomotives—Jeffrey Mfg. Co., Columbus 16, Ohio. Catalog 790 illustrates and describes the company's complete line of locomotives for main haulage, gathering and combined gathering and main haulage, with full specifications for each model. Detailed descriptions of design and equipment provide full information on the construction, operation and haulage capacities. A section on determining locomotive requirements is included.

Earth-Moving Machinery—Shovel & Crane Division, Lima Locomotive Works, Inc., Lima, Ohio. Bulletin No. 121-B describes the Lima Type No. 1201 shovel, crane and dragline. The application of "Precision" air control is explained and other advantages are described and illustrated. As a shovel the Lima Type No. 1201 has a capacity of 3½ cu.yd.; as a crane, 65 tons; and as a dragline, variable.

Motor Starters—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 14B6410 describes protection for men, motors and equipment afforded through the use of its Type H line of motor starters, which can be used with squirrel-cage, wound-rotor and synchronous motors ranging in size up to 700 hp. at 2,300 volts and 1,230 hp. at 4,160 or 4,600 volts.

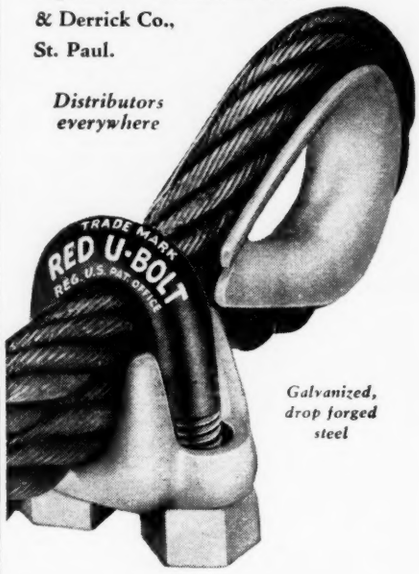
Copper-Alloy Welding—C. E. Phillips & Co., Inc., 2750 Poplar St., Detroit 8, Mich. Handbook contains definitions of materials and processes accompanied by a table of compositions and properties of the most commonly welded and brazed commercial copper alloys, general information on the welding characteristics of these materials and suggestions for preparing parts for welding, design of joints and the use of jigs and fixtures. Composition and characteristics of the common copper alloys are discussed.

Single-Roll Crushers—McLanahan & Stone Corp., Hollidaysburg, Pa. Bulletin describes and illustrates McLanahan Black Diamond single-roll crushers for coal and other similar materials. These crushers are said to fulfill the need for finer crushed sizes and answer the more recent demand for ef-

Easy to apply!

Every rigger knows the easy method of applying CROSBY Clips —drop forged steel for safety. A product of American Hoist & Derrick Co., St. Paul.

Distributors everywhere



Galvanized, drop forged steel

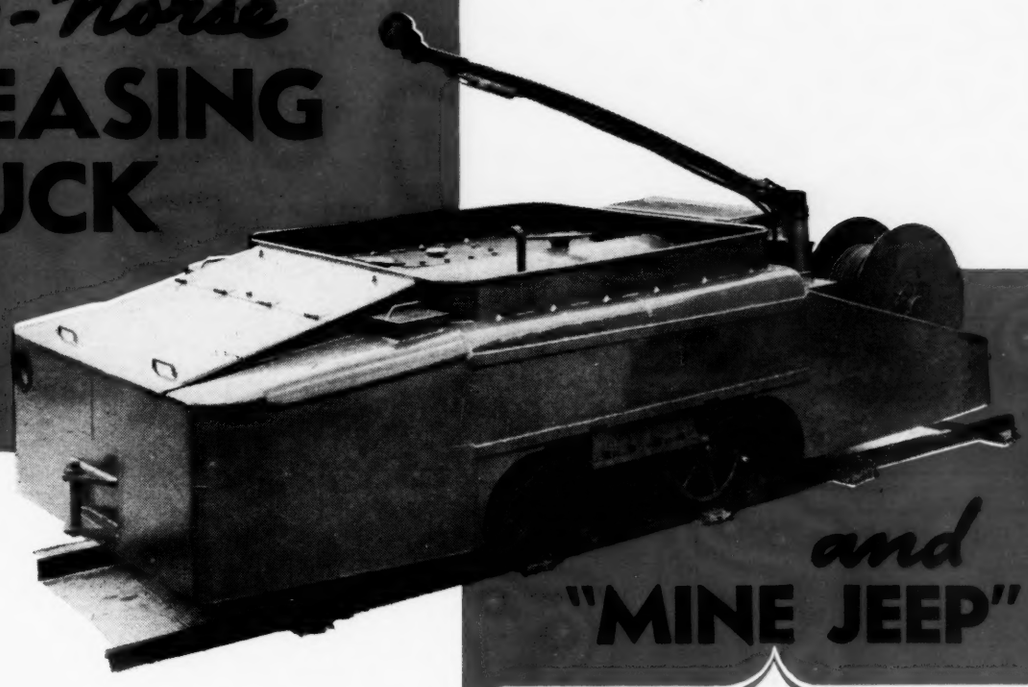
CROSBY CLIPS

REST where it is COOL

HOTEL Mayfair ST. LOUIS

AIR-CONDITIONED

Lee-Norse GREASING TRUCK and "MINE JEEP"



● With 50 percent of all mechanical failures due to faulty lubrication Lee-Norse offers a modern "Greasing Truck" as a solution to the problem.

This compact, mobile unit carries six barrels of mine lubricants and provides a quick, efficient method for lubricating mine machinery at the face. It also enables you to keep a better check on all mechanical equipment—eliminates costly breakdowns and repairs.

The car has three separate compartments for Hydraulic oil—Transmission lubricant and Chassis lubricant. It is equipped with separate motor driven air compressor and air operated grease gun and pressure gun.

The Lee-Norse "Mine-Jeep" is a special five-man vehicle for underground transportation of personnel. It hauls men to working face quicker—without fatigue—enabling them to do a better job.

The "Mine-Jeep" is light, fast, durable and easy to handle. It can be made to fit all track gauges—eliminates the use of locomotives or other equipment needed for hauling coal.

It is particularly adpated to coal mines for transportation of—Mine officials and visitors—Mine inspectors and rescue workers—Mine repair and maintenance crews—Mine surveying crews and others.

Lee-Norse Company
CHARLEROI, PA.

We completely overhaul and factory rebuild cutters—loaders and various kinds of mining machinery.

Phone Charleroi 750

ficient coal crushers to be used with automatic stokers in coaling stations, factories, homes and public buildings. Briefly reviewed, too, are McLanahan stationary or semi-portable coal-crushing tipples and the McLanahan "Rockmaster" all-steel crushers for coal, mine rock, refuse and rock of any size.

ARC-WELDING ELECTRODES—Metal & Thermit Corp., 120 Broadway, New York 5, N. Y. Technical bulletin covers hard surfacing and the use of Hardex electrodes in building up surfaces for resistance to shock and abrasion. The bulletin contains helpful information on effect of temperature and cooling rates on deposited metal, selection of the proper grade of rod and recommended welding techniques.

CLAMSHELL BUCKETS—Blaw-Knox Co., Pittsburgh, Pa. Catalog No. 2059 describes four-rope clamshell buckets designed for handling coal and most other granular free-flowing materials. Line drawings show various types of buckets and the manner in which they are geared and reeved. Various examples of superior performance in actual operation are given.

WIRE-ROPE CLIPS—American Hoist & Derrick Co., St. Paul 1, Minn. Pocket-sized information card on the use and application of Crosby wire-rope clips lists number of clips needed for various sizes of wire rope.

TRUCKS—Euclid Road Machinery Co., Cleveland 17, Ohio. Folder No. 101 features the Model F 15-ton rear-dump Euclid for off-the-highway hauling of earth, rock, ore and heavy excavation. This model has a struck measure capacity of 9.7 cu.yd. and a top speed (loaded) of 22 m.p.h. The 13-cu.yd. bottom-dump Euclid is described and illustrated in folder No. 201. Designed for big jobs, this Euclid has a payload capacity of 40,000 lb. Maximum speed (loaded) is 26 m.p.h.

BULLDOZERS—Caterpillar Tractor Co., Peoria 8, Ill. Broadside describes features and illustrates use of No. 3S and No. 7S (straight-type) bulldozers designed and built for exclusive use with "Caterpillar" diesel D8 and D7 tractors.

INDUSTRIAL EQUIPMENT & SUPPLIES—Precision Equipment Co., 32 North State St., Chicago 2, Ill. Catalog lists a complete line of industrial equipment and mill supplies as well as fans, steel shelving, lockers, electric tools, filing cabinets.

ELECTRODES—Hollup Corp., 4700 West 19th St., Chicago, Ill. "Selectrode Chart" guides electrode users in the choice of the correct electrodes for a specific job, suggests applications, shows currents, positions and physical characteristics for mild-, low-alloy and stainless steels, non-ferrous and cast iron, as well as surfacing and gas welding rods.

ELECTRONICS — Westinghouse Electric Corp., Pittsburgh 30, Pa. Booklet A-4726, "The Business Man's Guide to Electronics," explains how electronics is speeding production, saving time and materials and promoting safety in industrial operations. It describes the six fundamental functions of electronic tubes—rectifying, amplifying, generating, controlling, counting and sorting and inspecting—detailing the tubes required for each function. Among the applications described are electronic control for welding; electronic regulators for mixing and packaging; power conversion in mills, mines, factories and railroads; safety devices using photoelectric tubes; measuring and inspecting.

JACKS—Templeton, Kenly & Co., 1020 South Central Ave., Chicago 44, Ill. Pocket-size Catalog No. 45 describes and illustrates the numerous Simplex lever, screw and hydraulic jacks of conventional and special types in sizes from 3 to 100 tons, with specifications, dimensions, capacities, weights, etc. Also shown are recent additions to the Simplex line, such as 30- and 50-ton hydraulic jacks for heavy lifting and the new Simplex track shifter, which provides a labor-saving method of lining railroad track.

WIRE—Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa. Folder describes uses, advantages of construction and performance of Page Stainless Steel Strand and contains tabulations of sizes available, areas and weights.

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Authoritative Valuations, and Reports of Mining Properties Equipment and Operation.
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COAL LAND VALUATIONS
MINE INSTALLATION AND OPERATION
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To Yield Maximum Net Return
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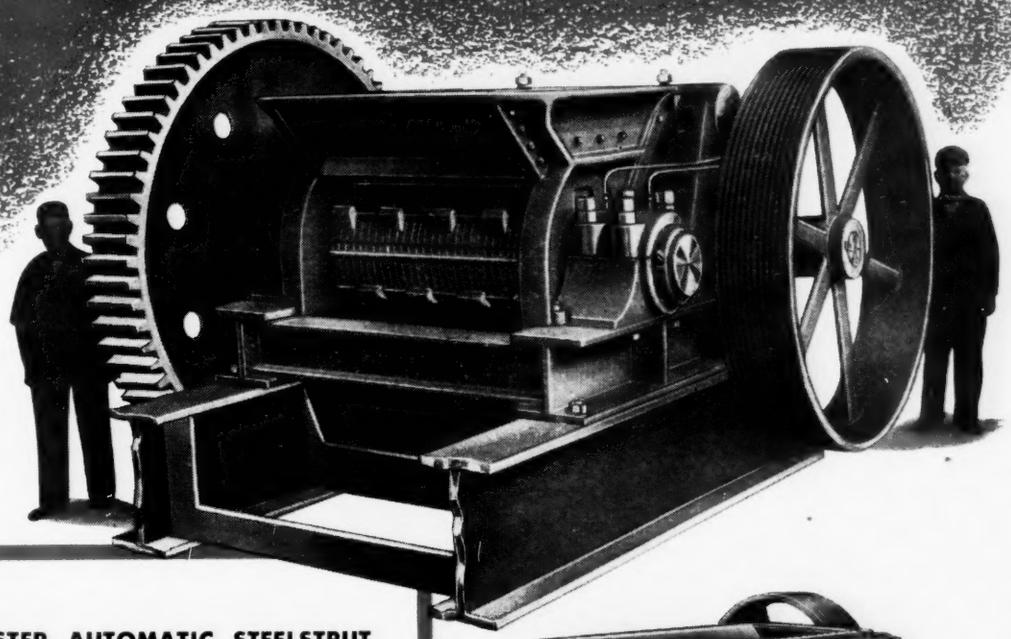
whose cards appear on this page
with the confidence justified by the offering of these special services nationally.

Modernize your production with

McLANAHAN

SINGLE ROLL

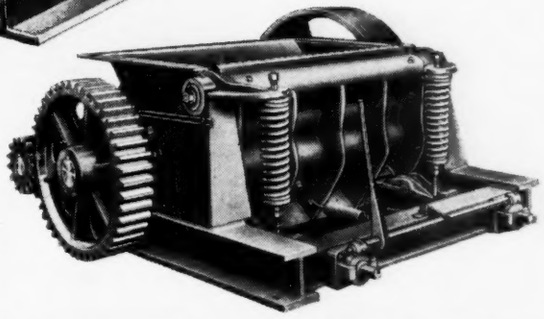
MINE REFUSE AND COAL CRUSHERS!



THE ROCKMASTER AUTOMATIC STEELSTRUT TOGGLE PRIMARY CRUSHER— REMARKABLE POWER AT LOW COST

Note These Real McLanahan Production Features . . .

● All Steel Constructed ● Cast Steel Gears ● Automatic Steelstrut Toggle for Tramp Iron Protection ● Chilled Alloy Iron or Steel, Interchangeable and Reversible Crushing Plate Liners ● Hard Surfaced Steel Segment Rolls Easily Replaced Without Dismantling Machine ● Takes Choke Feed ● Dry, Muddy, Wet or Frozen Material Never Packs ● Lowest Proportion of Flats and Dust Produced ● Slowest Speed of Moving Crushing Elements ● Greatest Crushing Range with Opening Easily Adjustable ● Takes Large Primary Sizes ● Low First Cost—Low Power Cost—Minimum Repair and Upkeep Costs.



FABRICATED BLACK DIAMOND CRUSHER

guarantees highest ton-per-dollar value!

One piece, rigid, well proportioned steel frame, cut steel gears, V-belt drive and industrial type lubrication. Automatic tramp iron protection.

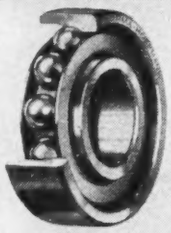
Get the McLANAHAN FACTS!

McLANAHAN & STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Since 1835

HOLLIDAYSBURG, PENNSYLVANIA

PRECISION BEARINGS



Separable (Magneto) Ball Bearing

FOR EVERY LOAD, SPEED AND DUTY

108 DISTINCT SERIES

BALL, ROLLER AND THRUST

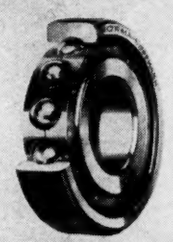
OVER 3000 SIZES

1/8" to 22 1/2" Bore—Metric and Inch Sizes

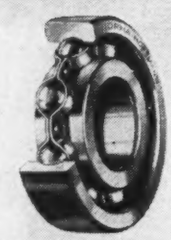
Write for the Catalog and Engineering Counsel

NORMA-HOFFMANN BEARINGS CORP'N. — STAMFORD, CONN., U. S. A.

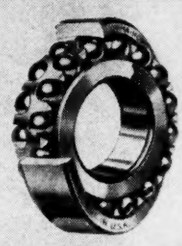
"NORMA-HOFFMANN"



Litro ("CL") Composition Retainer Ball Bearing

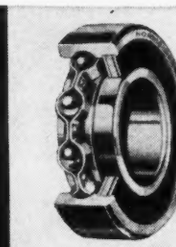


Single Row Ball Bearing

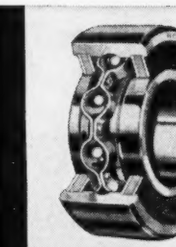


Double Row Self-Aligning Ball Bearing

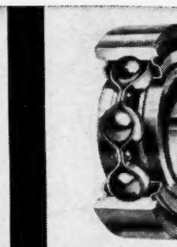
Shielded Type Single Row Ball Bearing



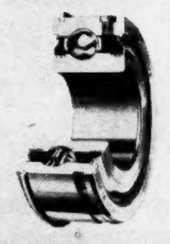
Single Felt Seal Ball Bearing



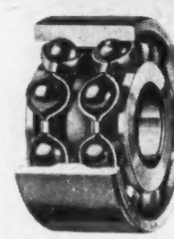
Double Felt Seal Ball Bearing



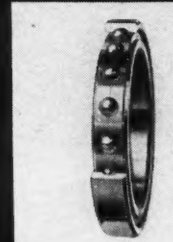
9000 Series (Feltless) Sealed Ball Bearing



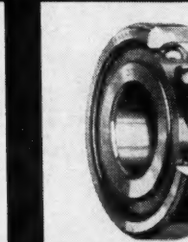
"Cartridge" Fully Sealed, Refillable Type Ball Bearing



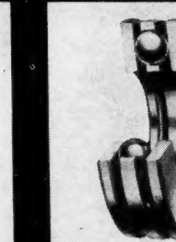
Double Row Ball Bearing



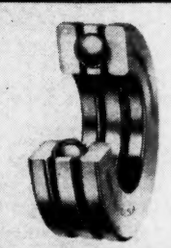
Extra Light Type Ball Bearing



Angular Contact Ball Bearing

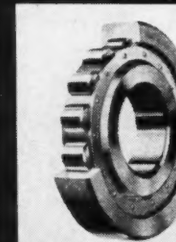


Extra Light Single Direction Ball Thrust Bearing

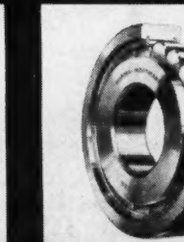


Single Direction Ball Thrust Bearing

Standard Cylindrical Roller Bearing

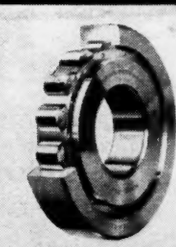


Type "E" Cylindrical Roller Bearing



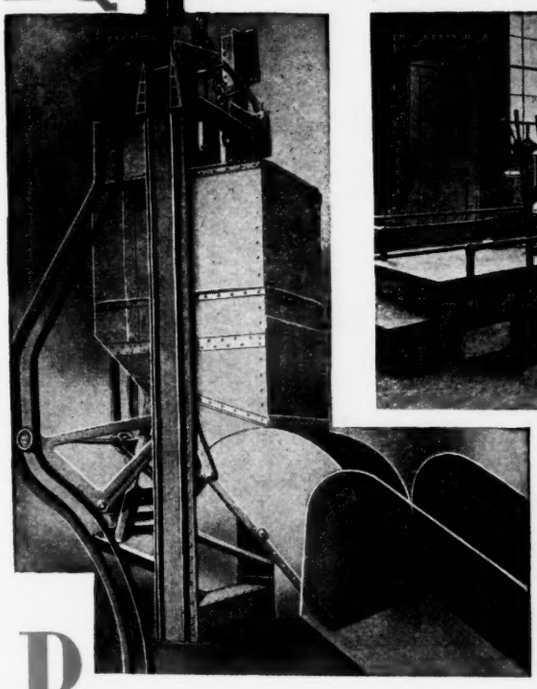
Full Type (Retainerless) Cylindrical Roller Bearing

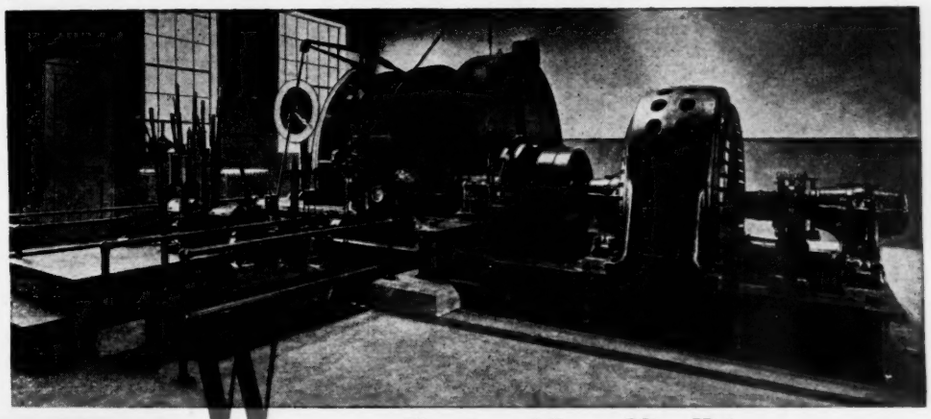
Extra Light Cylindrical Roller Bearing



Two-Lipped Cylindrical Roller Bearing

EQUIPMENT for MODERN MINING





Electric and Steam Mine Hoists

WE have no line of so-called "standard" hoists, but have been building steam and electric shaft and slope hoists for a third of a century. Each design is based upon a first-hand study of all the factors, right on the ground.

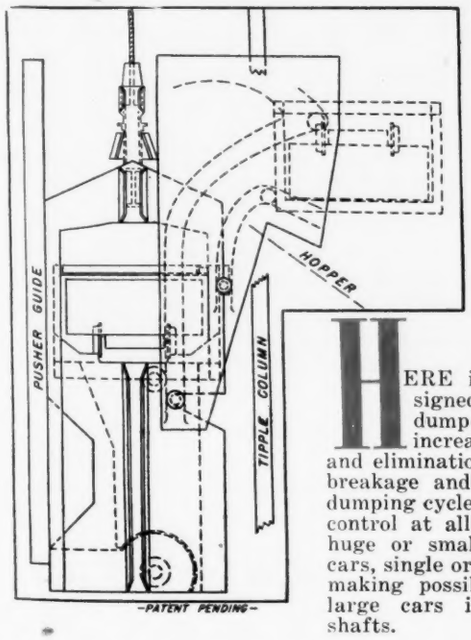
Lepley Automatic Safety Devices—We own and exclusively feature a really complete set of automatic safety devices, which are always incorporated into the complete design of our own hoists, but some of which can be applied to other hoists. These devices include: Slow-down and Stop Mechanism; Over-wind Trip Mechanism; Reversible Brake Mechanism; Hand Lever Mechanism; Man Hoist Trip Mechanism; Reduced-speed Trip Mechanism; Over-speed Control Governor, and Power-failure Trip Mechanism.

Lepley Bottom-Discharge Skip

BUILT for vertical shafts, in any capacity or speed desired. Only one man is required for its operation.

All parts of the Skip are sturdily constructed to give an unequalled service under severe mine operating conditions, and the design is such that operation is positive and almost maintenance-proof. All bearings are provided with graphite lubrication that needs little care.

Each Skip is designed and built to suit the particular conditions existing in the mine.

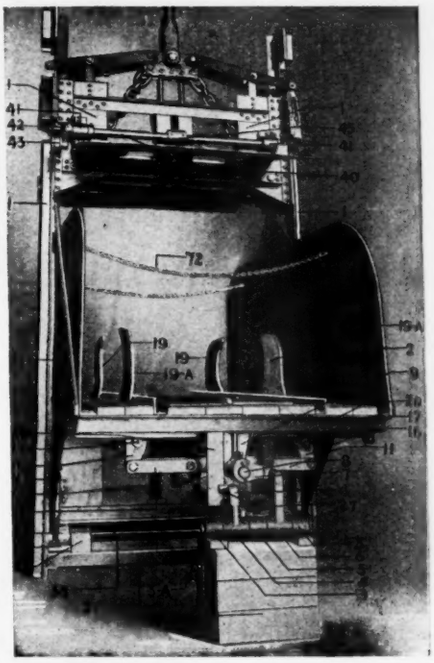


HERE is a newly designed cage and dump which assures increased production and elimination of skip hoist breakage and dust. Smooth dumping cycle, with complete control at all points, dumps huge or small, solid bodied cars, single or double hoisted, making possible the use of large cars in old narrow shafts.

Sheave Before Assembling

Rope and Cable Sheaves

Our rope and cable sheaves are famous for their great strength and elasticity, which permit them to safely withstand the heavy loads, shocks and stresses encountered in the mining field. All parts machined true; exclusive renewable wearing surface feature; any diameter up to 14 ft.



Lepley Self-Dumping Safety Cages

A CAGE which, with one-man operation, will economically and safely hoist and dump 4 cars of coal (of 3 tons each) per minute at a distance of 400 ft. without spilling their contents into the shaft.

All mechanical parts of the Cage are made of high-grade steel castings and forgings of liberal proportions, and are made in the manner that many years of successful experience has shown to assure long, safe, dependable service. The flooring between the rails is hinged in the center so that the mechanism underneath is readily accessible for inspection, adjustment and lubrication.

CONNELLSVILLE MFG. & MINE SUPPLY CO.

Manufacturers of Electric and Steam Hoists, Automatic Hoist Controls, Coal Hoist Skips and Cages, Car Cagers and Rotary Dumps, Mine Fans, Rotary Slate and Rock Dump Cars. Mine Pumps, Sheaves.

General Office and Plant: CONNELLSVILLE, PENNA.

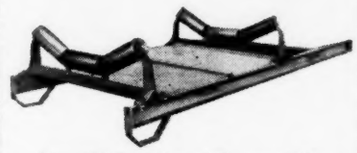
SOUTHERN REPRESENTATIVES: Ebbert & Kirkman Co., Brown-Marx Bldg., Birmingham, Ala.

Why B-G Conveyors Provide Simplified Installation

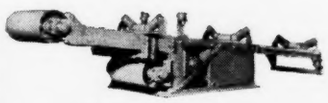
• Barber-Greene Conveyors are built on a *unit* basis—*pre-engineered* and *pre-fabricated*—with a wide range of equipment in the sizes and types that best meet your haulage requirements.

Standardized units include factory-assembled drives and take-ups; truss, channel, and low-seam frames; roll or ball-bearing carriers, "A" frames, walkways, loading hoppers, and discharge spouts. Field assembly of miscellaneous pulleys, bearings, and dozens of other parts, is completely eliminated.

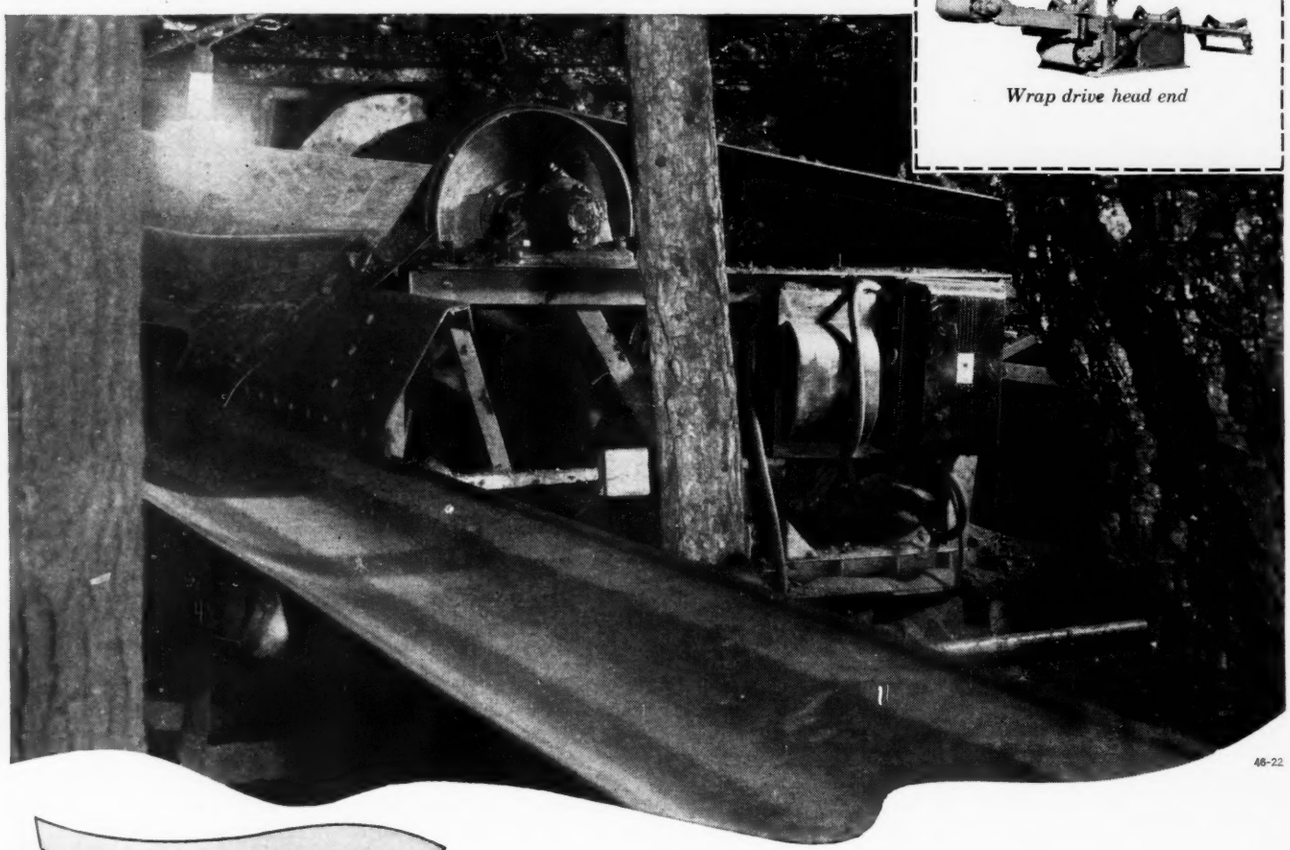
Standardization also permits interchangeability . . . makes installation, alteration, and moving quick and easy. Investigate the many other advantages of B-G Conveyors, and call in our mining engineers to help you plan an efficient, economical haulage system. Barber-Greene Company, Aurora, Illinois.



Assembled section with removable decking plates



Wrap drive head end



46-22

B-G Barber-Greene CONSTANT FLOW EQUIPMENT

LOADERS • PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

Complete

DRILLING AND BLASTING SERVICE

THROUGHOUT ILLINOIS, INDIANA AND WESTERN KENTUCKY

DRILLING
COAL MASTER
TOOLS

WE NOW STOCK COALMASTER DRILLING TOOLS

You'll get faster deliveries — plus valuable help with your drilling and blasting problems from our trained service men without cost or obligation. We can quickly supply everything you need from our nearby stock:

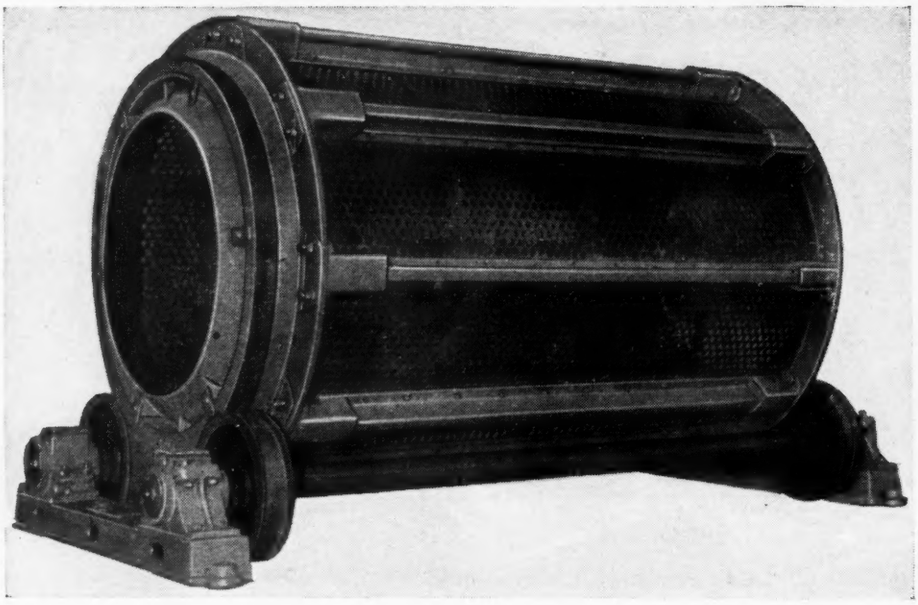
- Chicago Pneumatic Post-Mounted and Hand-Held Drills
- Air Compressors • Rock Drills • Timken Rock Bits
- Bit Steel • Vertical Coal Drills
- Horizontal and Vertical Overburden Drills for Strip Mines
- Drill Trucks—also Rubber Tired for Trackless Mines
- Waterproof, Waxed and Plain Tamping Bags
- Austin Explosives and Blasting Supplies

...AND A COMPLETE GENERAL LINE OF MINE SUPPLIES

DIAMOND SUPPLY COMPANY, INC.

P. O. BOX 177 • EVANSVILLE 5, INDIANA • PHONE 44223

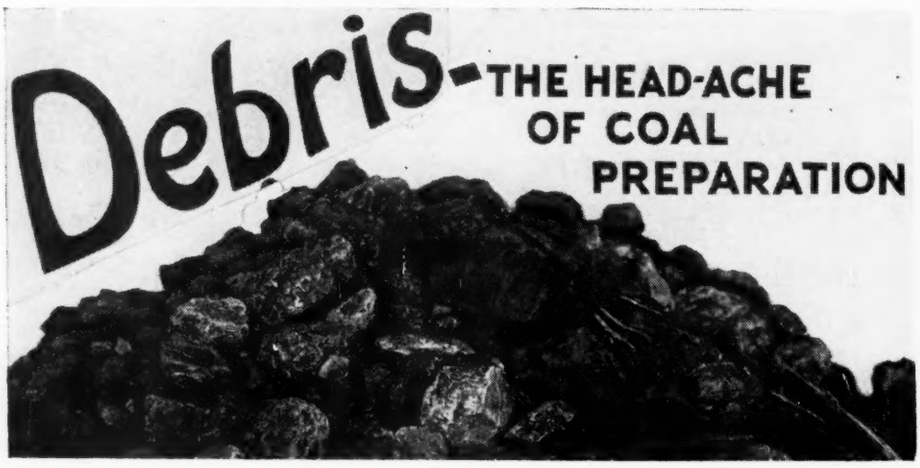
"PENNSYLVANIA" *STEELBUILT*



THE "PENNSYLVANIA" BRADFORD BREAKER DOES FOUR IMPORTANT JOBS

1. Takes Shovel-loaded full seam mined Bituminous coal, and automatically removes Big Rock, Tramp Iron, and Mine Refuse.
2. Automatically Trims Good Coal from Binder.
3. Delivers a product 100% to the Sizes required for Cleaning.
4. Eliminates Picking and Scalping Operations,—and requires Minimum Power and Maintenance.

Massive *STEELBUILT* construction
Capacity range 50 to 1500 tons hourly



We will be glad to have one of our Engineers observe and report your requirements, as a basis for our recommendation. Write us!

New York, Pittsburgh,
Chicago, Los Angeles, Birmingham

PENNSYLVANIA CRUSHER COMPANY

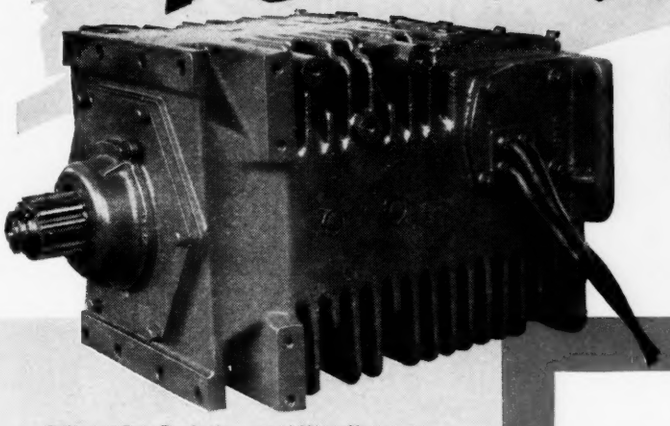
Associated with Fraser & Chalmers
Engineering Works, London

1706 Liberty Trust Bldg., Philadelphia 7, Pennsylvania

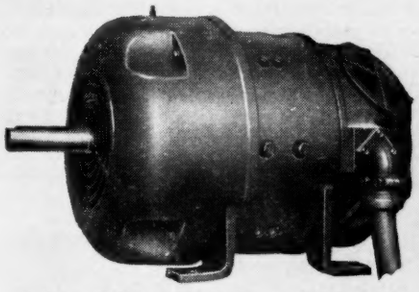
COAL PREPARATION MACHINERY

70% of all coal loaders are powered with

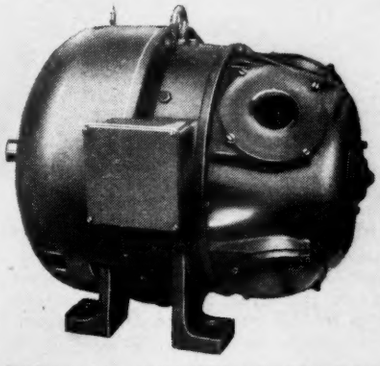
RELIANCE MOTORS



Reliance D-c. Explosion-proof Mine Motor, specially designed for loading equipment.



Reliance Fully-enclosed, Fan-cooled D-c. Mine Motor for use on permissible underground equipment.



Reliance Fully-enclosed, Fan-cooled D-c. Motor for use where permissible equipment is not required.

Especially designed both electrically and mechanically for tough underground service Reliance Motors are maintaining remarkable production records.

Vital parts are thoroughly protected from coal dust and moisture. These motors are also meeting the unusual power needs of underground conveyors — of preparation equipment in the tipple—and of other vital equipment around mine properties.

On the record of Reliance Motors now in the industry it will pay you to specify them on original equipment and for replacement.

•

RELIANCE ELECTRIC & ENGINEERING CO.
1055 Ivanhoe Road • Cleveland 10, Ohio

Birmingham • Boston • Buffalo • Chicago • Cincinnati • Denver • Detroit
Gary • Greenville • Houston • Kalamazoo • Kansas City • Knoxville
Los Angeles • Milwaukee • Minneapolis • New Orleans • New York
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RELIANCE A-C D-C MOTORS

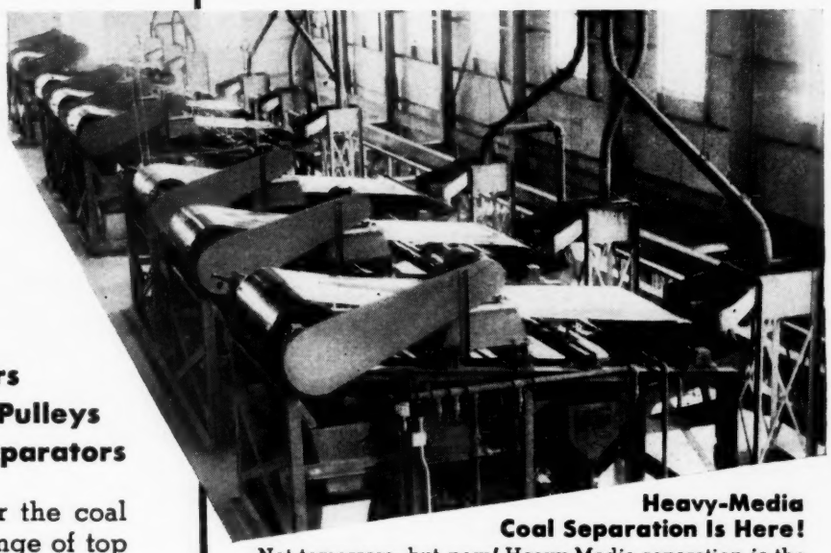
"Motor-Drive is More Than Power"

DINGS MAGNETIC ENGINEERING

. . . for the Coal Industry

- **Lifting Magnets**
- **Magnetic Clutches**
- **Magnetic Detectors**
- **Rectangular Magnets**
- **Drum Type Separators**
- **Pulley Type Separators**
- **Magnetic Drill Extractors**
- **Spout and Chute Magnets**
  Automatic-discharge—electric
  Alnico—non-electric
- **Special Magnetic Separators**
- **"High Intensity" Magnetic Pulleys**
- **Dings-Crockett Wet Type Separators**

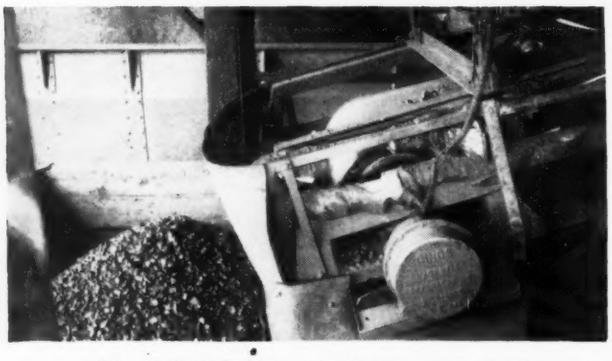
Dings Magnetic Engineering for the coal industry combines Dings full range of top quality magnetic equipment with 47 years of experience in getting the right machine in the right place for best results on each job. For prompt, *helpful* assistance on your magnetic equipment problems, call Dings.



Heavy-Media Coal Separation Is Here!

Not tomorrow—but *now!* Heavy-Media separation is the modern method for getting most efficient and economical recovery of usable coal out of your mine run. Dings-Crockett Separators, like the battery shown above, are an integral part of Heavy-Media Process separation plants . . ."Standard" equipment for making media recoveries up to 99.9%! Get the important story on Heavy-Media separation from Dings.

DINGS POSITIVE TRAMP IRON PROTECTION



Dings "High Intensity" Magnetic Pulleys

Positive, automatic tramp iron removal with Dings air-cooled Magnetic Pulleys . . . Continuous, full-strength magnetic protection for your equipment and your customer's stokers. Full data on Dings Pulleys in Catalog No. 260 . . . Ask for it.

Dings Magnetic Tramp Iron Detectors

Automatic, timely warning when tramp iron on a fast-moving, heavily-loaded conveyor belt passes the Dings Magnetic Detector. Signals presence of iron particles down to 0.2 cu. in. size. Details from Dings on request.

NEW! Dings Magnetic Drill Extractor!

Fast, easy recovery of drill bits and rod lost in drill holes. Dings Drill Extractor can be carried in a pocket . . . put to use in a few seconds. Powerful Alnico steel magnet lifts up to 40 times its own weight! Write for Drill Extractor Data Sheet.

DINGS MAGNETIC SEPARATOR CO.

506 E. Smith Street • Milwaukee 7, Wisconsin

Dings

"HIGH INTENSITY"

"Separation Headquarters Since 1899"

Collyer

PORTABLE CABLE

MEETS NEW SPECIFICATIONS

OF THE COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF MINES

FOR FLAME RESISTANT CABLES

COLLYER Heavy Duty Neoprene Sheathed Portable Cables, highly resistant to flame, chemicals, oil and abuse, fully meet the rigid specifications for mining cables established in the interest of public safety by the Pennsylvania Department of Mines. Designed with maximum flexibility for constant reeling and unreeling, and protected against chafing or abrasion by a tough, smooth jacket, this cable is giving outstanding service on locomotives, cutting machines, loaders, conveyors and every type of mining machinery. Available in Single and Multi-conductor.

These Features mean Safety and Economy:

1. Lead-cured neoprene sheath, dense, tough . . . resists flame, chemicals, oil and abuse.
2. Neoprene cushioning belt, highly resilient, with reinforcing open twine braid.
3. Multiple conductors cabled with suitable fillers . . . flexible, easy to handle.
4. Heat-resistant rubber insulation . . . safe for heavy overloads.
5. Rope-stranded, tinned copper wires give flexibility . . . resist both tension and torsion.

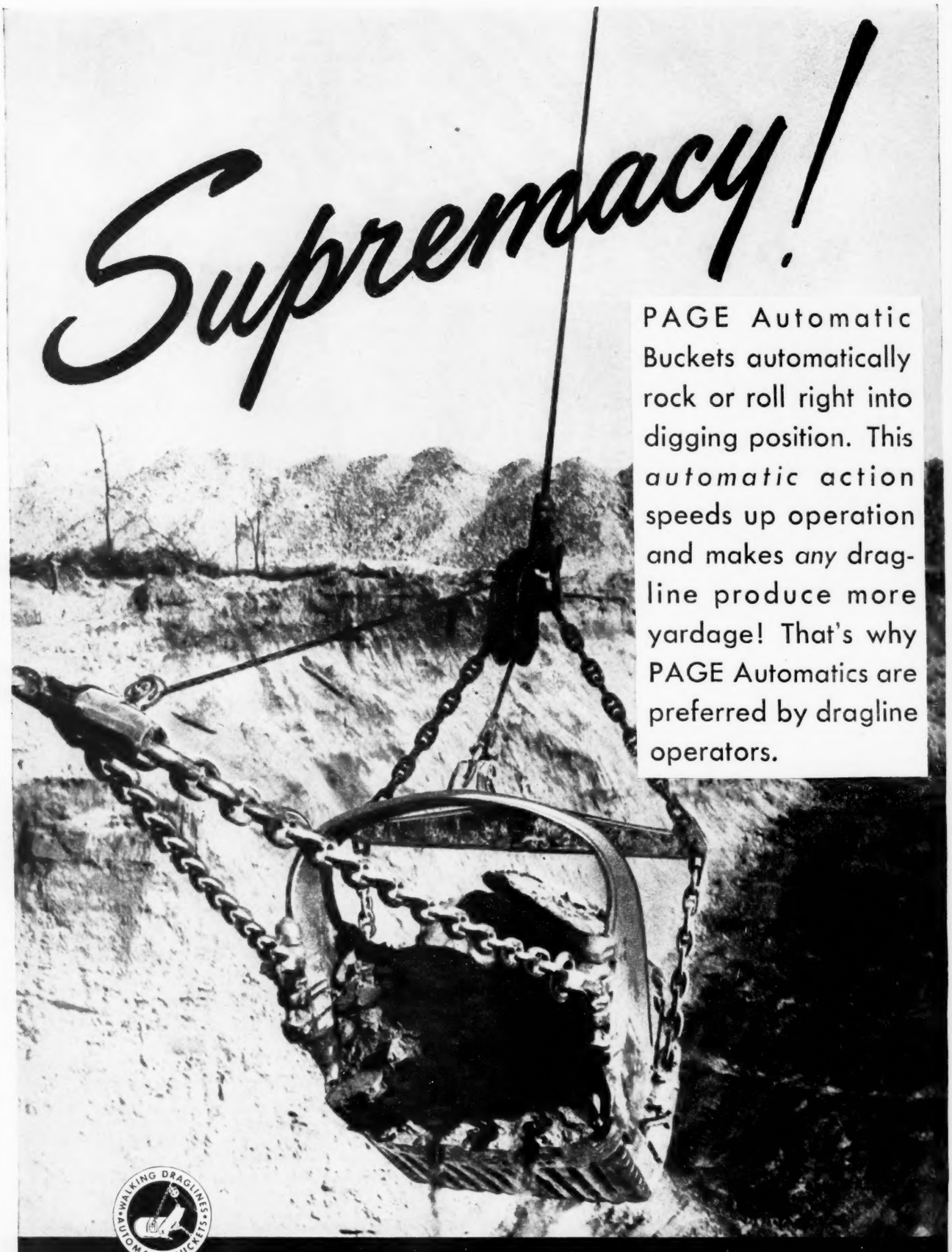
Let us know your requirements.

Collyer

INSULATED WIRE COMPANY

245 Roosevelt Ave., Pawtucket, R. I.

Supremacy!



PAGE Automatic Buckets automatically rock or roll right into digging position. This *automatic* action speeds up operation and makes *any* dragline produce more yardage! That's why PAGE Automatics are preferred by dragline operators.

WALKING DRAGLINES • AUTOMATIC BUCKETS •

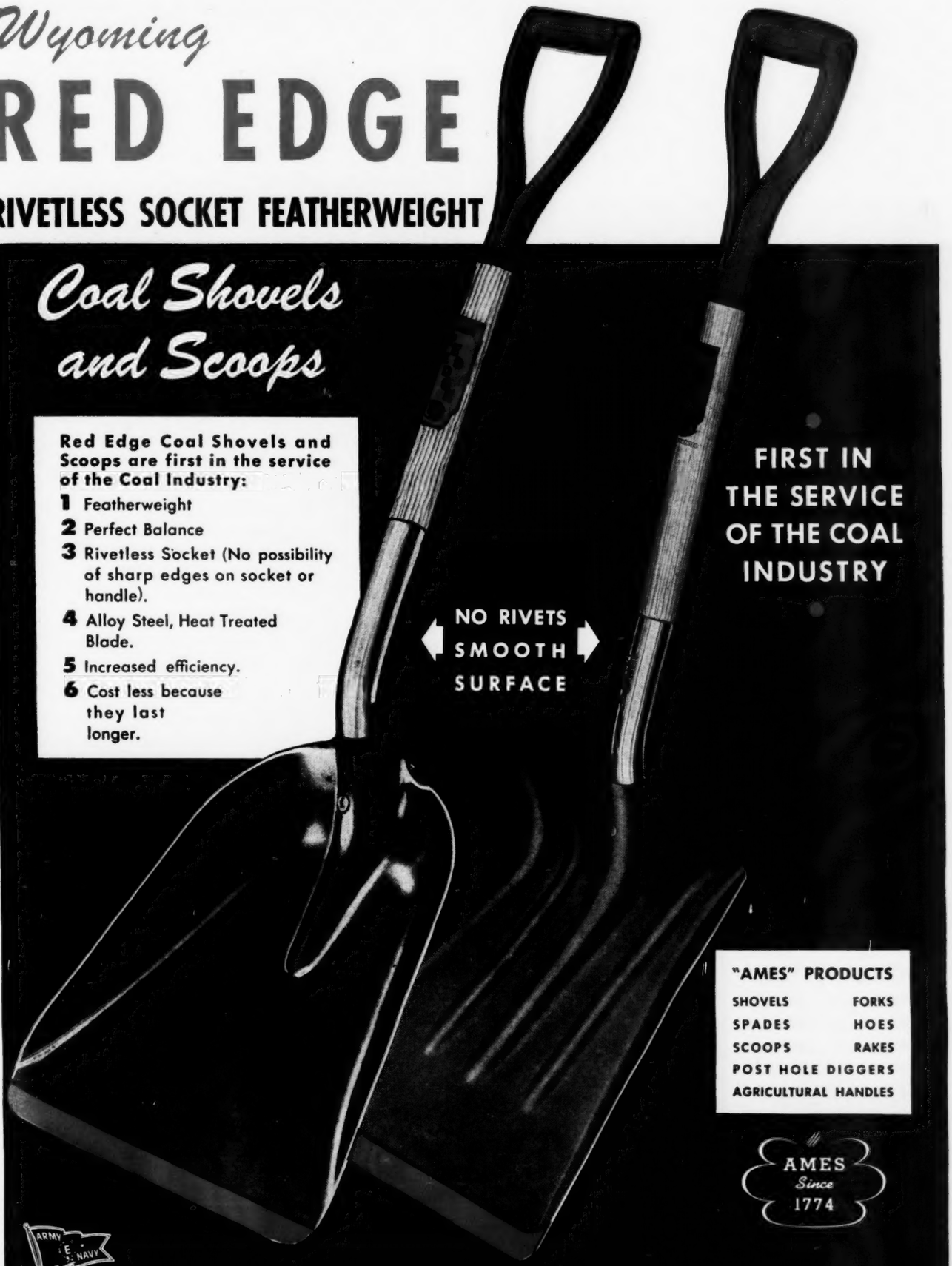
PAGE ENGINEERING COMPANY
CHICAGO 38, ILLINOIS

Wyoming

RED EDGE

RIVETLESS SOCKET FEATHERWEIGHT

Coal Shovels and Scoops



Red Edge Coal Shovels and Scoops are first in the service of the Coal Industry:

1. Featherweight
2. Perfect Balance
3. Rivetless Socket (No possibility of sharp edges on socket or handle).
4. Alloy Steel, Heat Treated Blade.
5. Increased efficiency.
6. Cost less because they last longer.

NO RIVETS
SMOOTH
SURFACE

FIRST IN THE SERVICE OF THE COAL INDUSTRY

"AMES" PRODUCTS

SHOVELS	FORKS
SPADES	HOES
SCOOPS	RAKES
POST HOLE DIGGERS	
AGRICULTURAL HANDLES	

AMES *Since* 1774

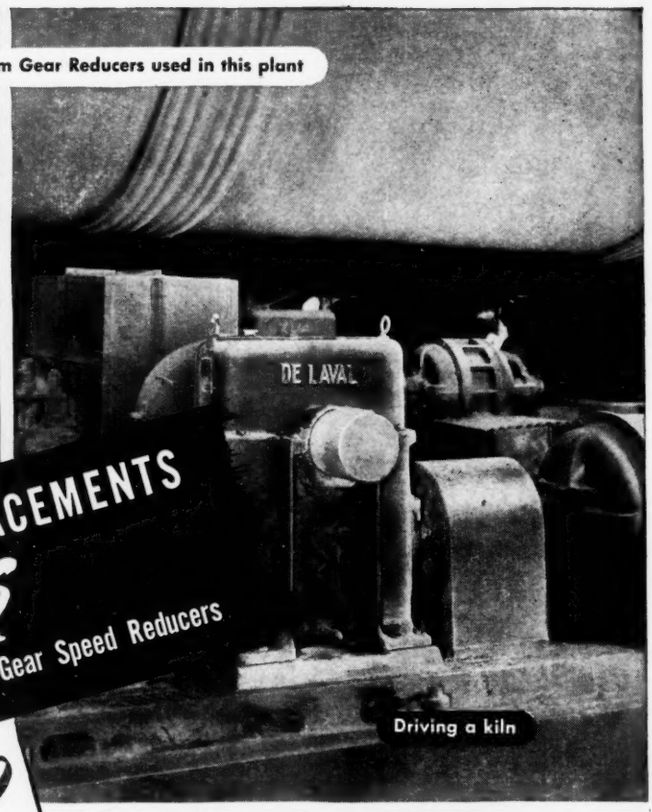
ARMY E NAVY

AMES BALDWIN WYOMING CO.

PARKERSBURG, W. VA. NORTH EASTON, MASS.

A few of the many De Laval Worm Gear Reducers used in this plant

Driving a kiln feeder



Driving a kiln

PRACTICALLY NO PARTS REPLACEMENTS in 19 YEARS

Reported by Plant Employing Many De Laval Worm Gear Speed Reducers

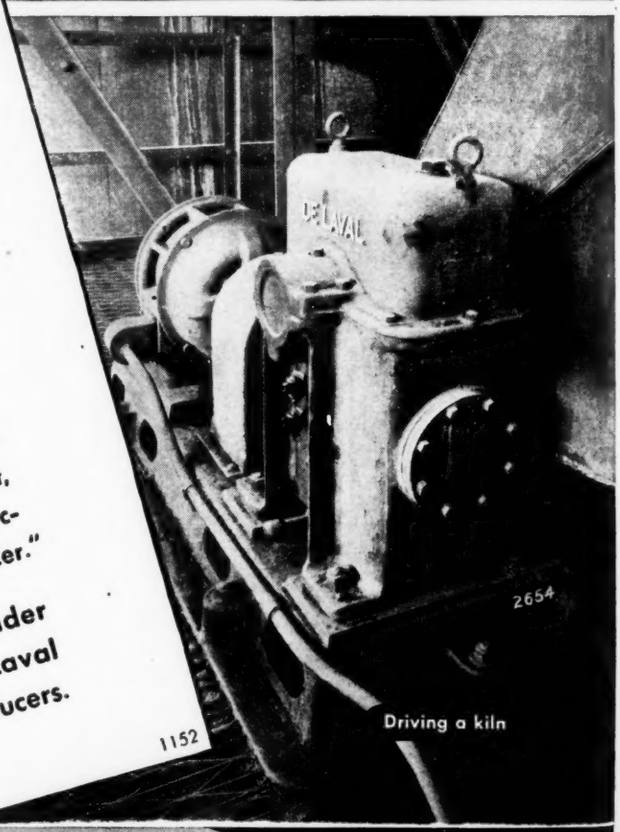
How's that for Reliability?

De Laval Worm Gear Speed Reducers have given such good service in a certain cement mill (name furnished on request) that the Plant Superintendent has written of their performance:

"There are about 175 reducers of various sizes in operation in this plant on a wide diversity of jobs; and during the last eighteen or nineteen years, since the original ones were installed, we have had to make practically no replacements of worms, wheels or bearings. In fact, there has never been any interruption in production by reason of the failure of a speed reducer."

For reliable, trouble-free service under severe conditions, specify De Laval Worm Gear Speed Reducers.

1152



Driving a kiln

TURBINES • HELICAL GEARS and WORM GEAR SPEED REDUCERS CENTRIFUGAL PUMPS • CENTRIFUGAL BLOWERS and COMPRESSORS • IMO OIL PUMPS

WORM GEAR DIVISION

DE LAVAL

STEAM TURBINE COMPANY · TRENTON 2, NEW JERSEY

SALES OFFICES ATLANTA • BOSTON • CHARLOTTE • CHICAGO • CLEVELAND • DENVER DETROIT • HELENA • HONOLULU • HOUSTON KANSAS CITY • LOS ANGELES • MANILA MONTREAL • NEW HAVEN • NEW ORLEANS NEW YORK • PHILADELPHIA • PITTSBURGH ROCHESTER • ST. PAUL • SALT LAKE CITY • SAN FRANCISCO • SEATTLE • TORONTO • TULSA VANCOUVER • WASHINGTON, D. C. • WINNIPEG And Cities in Central and South America

EDISON

ELECTRIC CAP LAMPS

M-S-A

COMFO CAPS

SERVE IN MODERN MINING

The benefits of better safety, conferred by the working combination of Edison Electric Cap Lamps and M.S.A. Comfo Caps, promote increased production wherever this equipment is employed. *More effective light* reduces unseen hazards and speeds the job . . . *proved head protection* guards against overhead dangers and increases comfort. Let Edison Lamps with M.S.A. Comfo Caps serve *your* mining operations—ask for a demonstration!

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS PITTSBURGH 8, PA.

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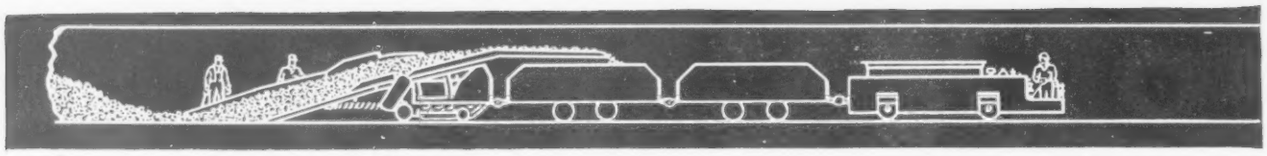
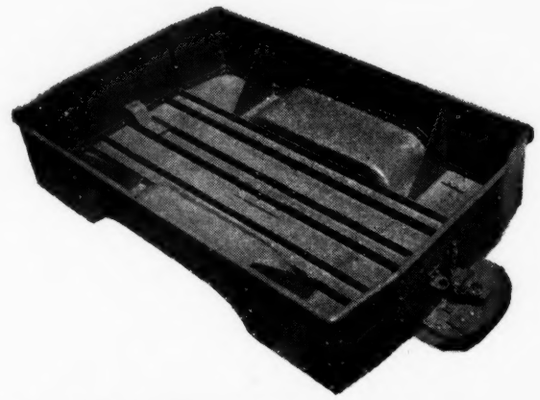
MINE SAFETY APPLIANCES CO. (S.A.) (PTY.) LTD.
Johannesburg, South Africa N'Dola—Northern Rhodesia

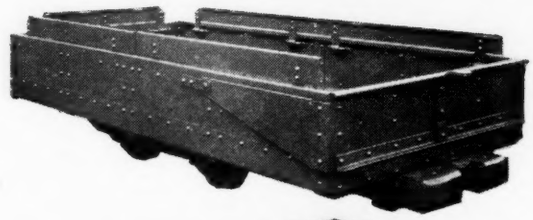


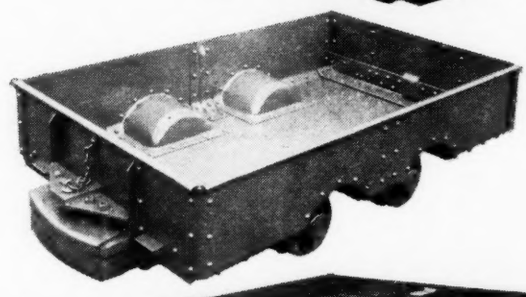
EFFICIENCY

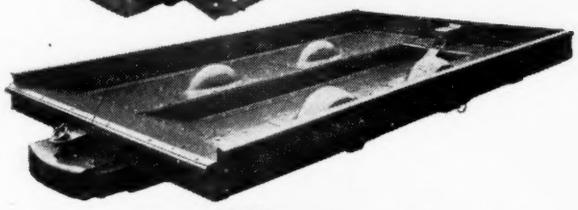
Demands Cars That Fit Your Mine

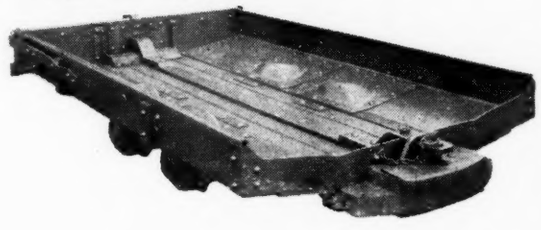
ENTERPRISE Cars have promoted efficiency in many of the mines which attained the COAL AGE Awards. They will continue to better the tonnage records wherever installed.











Enterprise

engineering assures your mine of cars which fit *your* headroom and *your* loading equipment.

We will work with you to design cars specially to meet the hauling conditions of your property.

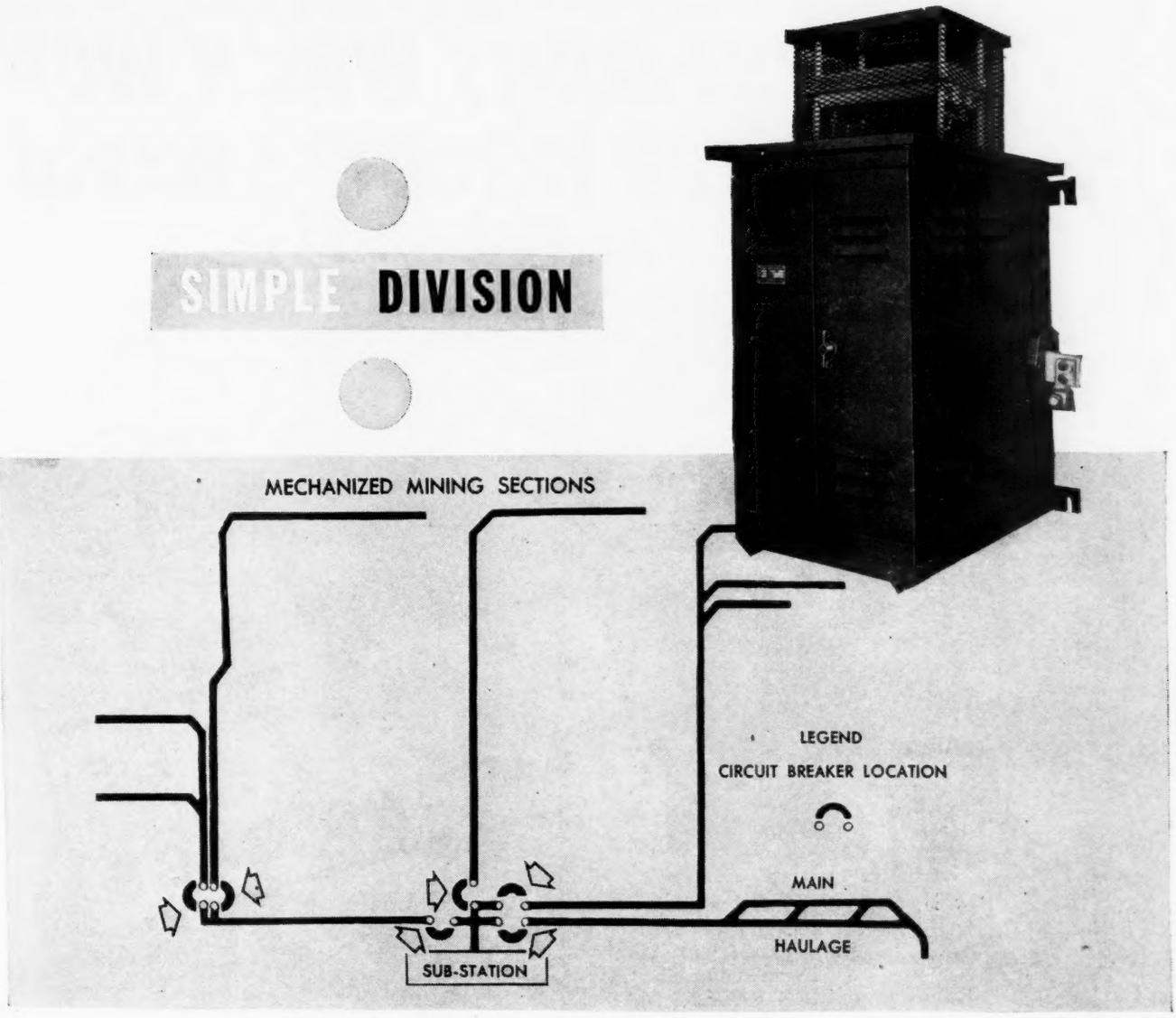
Your inquiries will be welcome.

ENTERPRISE

WHEEL & CAR CORPORATION

BRISTOL, VA.—TENN. HUNTINGTON, W. VA.

SIMPLE DIVISION



. . . increases mine profits

You obtain maximum uninterrupted production when you divide your mine with I-T-E Circuit Breakers. Electrical disturbances in one section have no effect on the rest of the mine. No needlessly idle men and machinery. Sectionalizing as an aid to operating continuity has added as much as 10% to daily tonnages of some mines.

I-T-E Sectionalizing Circuit Breakers open automatically when currents become excessive, reclose automatically with the return of normal load conditions. Even though unattended, these sensitive circuit breakers detect disturbances on either side of them and quickly separate substations. Remote "shorts" can't be fed by distant substations.

Since I-T-E Circuit Breakers are located to protect small sections of the mine, they can be set for light overloading situations, lessening the danger of fallen trolley wires and minimizing fire hazards.

Progressive management recognizes the advantages of I-T-E Circuit Breakers. Increased overall production, more economical use of power and decreased maintenance of electrical equipment soon pay for an I-T-E Sectionalizing Circuit Breaker installation.

Write today for Bulletin 2503 which contains a detailed description of this equipment or, if you have an immediate problem, contact the nearest I-T-E engineering representative. The I-T-E Circuit Breaker Co., 19th and Hamilton Streets, Phila. 30, Pa.

Application Engineers in Principal Mining Areas

I-T-E SECTIONALIZING CIRCUIT BREAKERS

1/3 OF THE MINES WHICH WON "COAL-FOR-VICTORY" AWARDS use...

SEAL-TITE SAFETY SEAM TAMPING BAGS

★ **SAFETY!** The seams are reinforced and sealed for greater strength and safety. Less explosives are used—you avoid the shattering heavy blasts which endanger mine roof and working structures.

★ **LESS CHARGES!** The safe, solid stemming which is possible increases the effectiveness of every charge.

★ **FULL PROPER TAMPING!** The variety of sizes and the dependability of SEAL-TITE make full, efficient stemming possible.

★ **SAVE MONEY!** With all of the benefits and advantages of SEAL-TITE it is only natural that money is saved in time, effort, and materials.

17! SEAL-TITE Safety Seam Tamping Bags come in 17 different stock sizes. Special sizes made to order.

YOU will increase *efficiency* and get new *production* advantages in your mine when you begin using SEAL-TITE TAMPING BAGS.

The uniformity of blasting that comes with SEAL-TITE means a worthwhile cut in production costs.

NOW IMPROVED: SEAL-TITE TAMPING BAGS for normal conditions are now made of a new Moisture Resistant Paper. ALSO, we make a heavier bag for use in wet holes.

Keep a stock of SEAL-TITE Tamping Bags properly filled. Be prepared with sufficient numbers so that blasting can be conducted with greater speed and efficiency.

We make shipments from stock upon receipt of order.

FREE SAMPLES

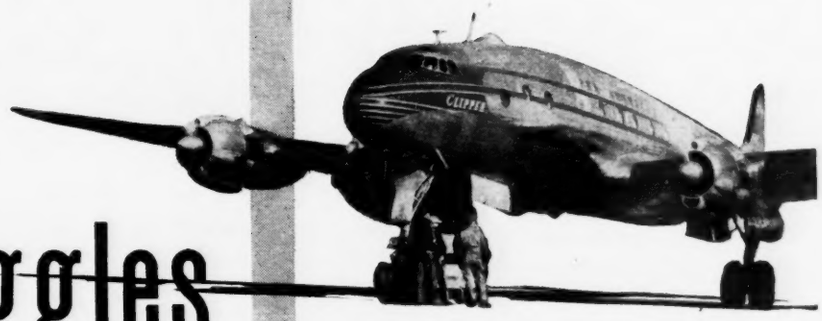
We will be glad to send samples upon request. No obligation

FILL AND PACK 400 TO 600 BAGS PER HOUR WITH "THE DUMMY MAKER"

● This machine is for use with SEAL-TITE Tamping Bags . . . relieves worry . . . assures better, safer working conditions . . . convenient . . . dependable . . . inexpensive . . . furnishes an ever-ready supply of safe, properly filled Dummies . . . uses clay, rock dust, or sand . . . requires only one or two unskilled operators . . . operates on ¼ h.p. motor from trolley circuit . . . mounted on trucks for portability . . . pays for itself in a short time.

THE TAMPING BAG COMPANY MOUNT VERNON, ILLINOIS

AO Safety Goggles



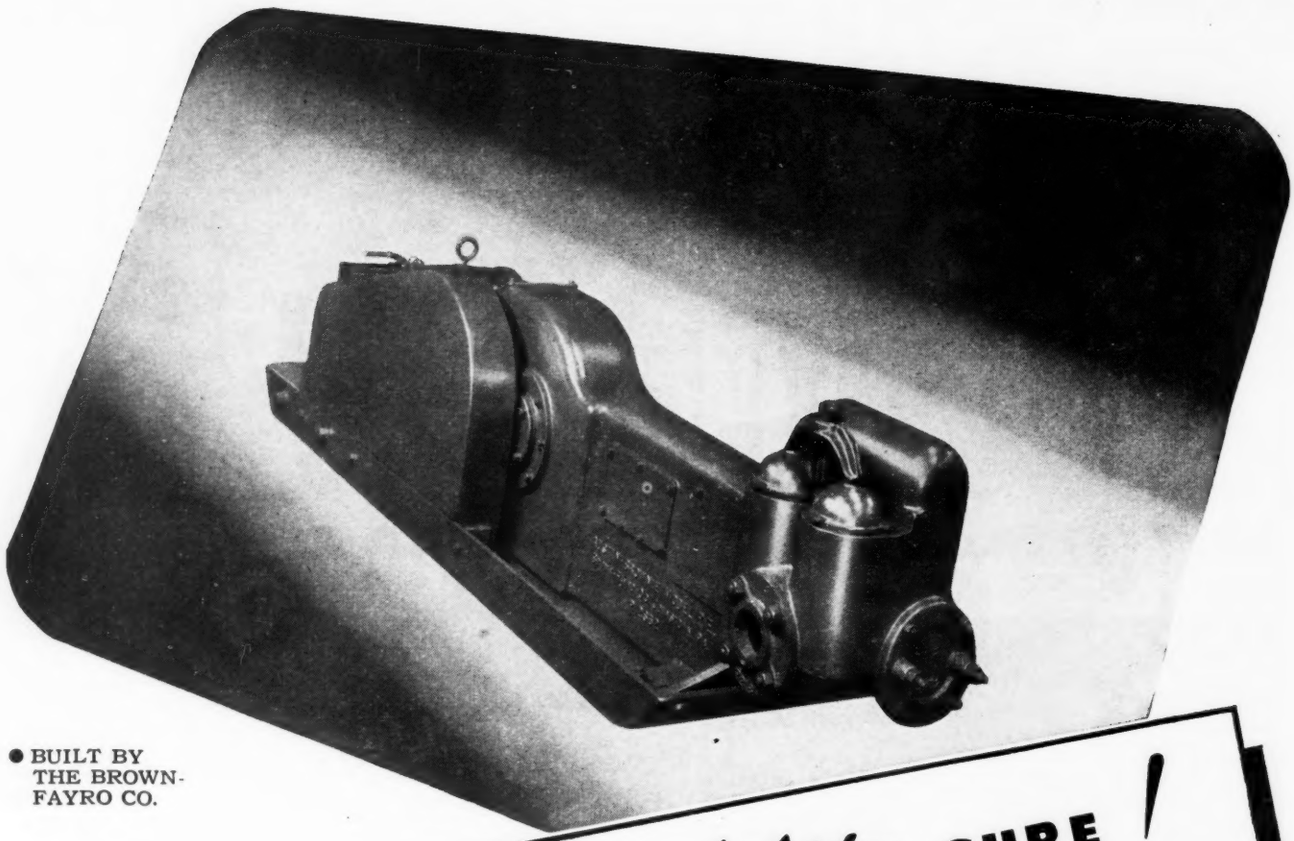
Help Cut Maintenance Costs of PAA Constellations

Pan American World Airways System writes: "With drastic fare reductions plus high speed operations, costly personal injuries cannot be afforded—accident prevention is a 'must.' Our pattern of Clipper maintenance has been subject to many changes, but, since AO Safety Goggles have always fitted in, it is only natural that we should reorder this equipment."

AO Safety Goggles are helping to reduce costs in hundreds of other progressive American industries. If *your* plant is not adequately equipped for cost reduction through safety, your nearest MSA Representative will be glad to help you work out a satisfactory program.

American Optical
COMPANY
Safety Division

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES



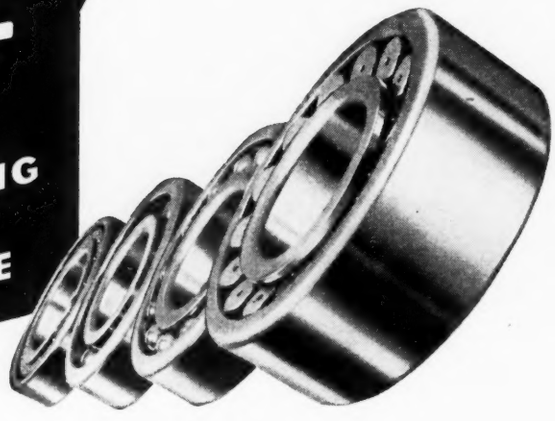
● BUILT BY THE BROWN-FAYRO CO.

MAKE *Reliability* SURE!

Miners do not have their work impeded by water when this 4 x 5 Mine Gathering Pump is helping them. For this pump moves water from one or more working places directly to the outside or to a sump. And on this pump are SKF Deep Groove Ball Bearings with their deep, uninterrupted raceways permitting radial and thrust loads in any combination in either direction. Their small internal clearance locates the shaft accurately, maintaining a uniform clearance between the rotor and stationary parts. As the days pass by into years, they need only occasional lubrication for smooth running. In a pump, the right bearing in the right place means *reliability* . . . and the right bearing is an SKF. 5998

SKF INDUSTRIES, INC., PHILA. 34, PA.

SKF
Puts the
RIGHT BEARING
in the
RIGHT PLACE



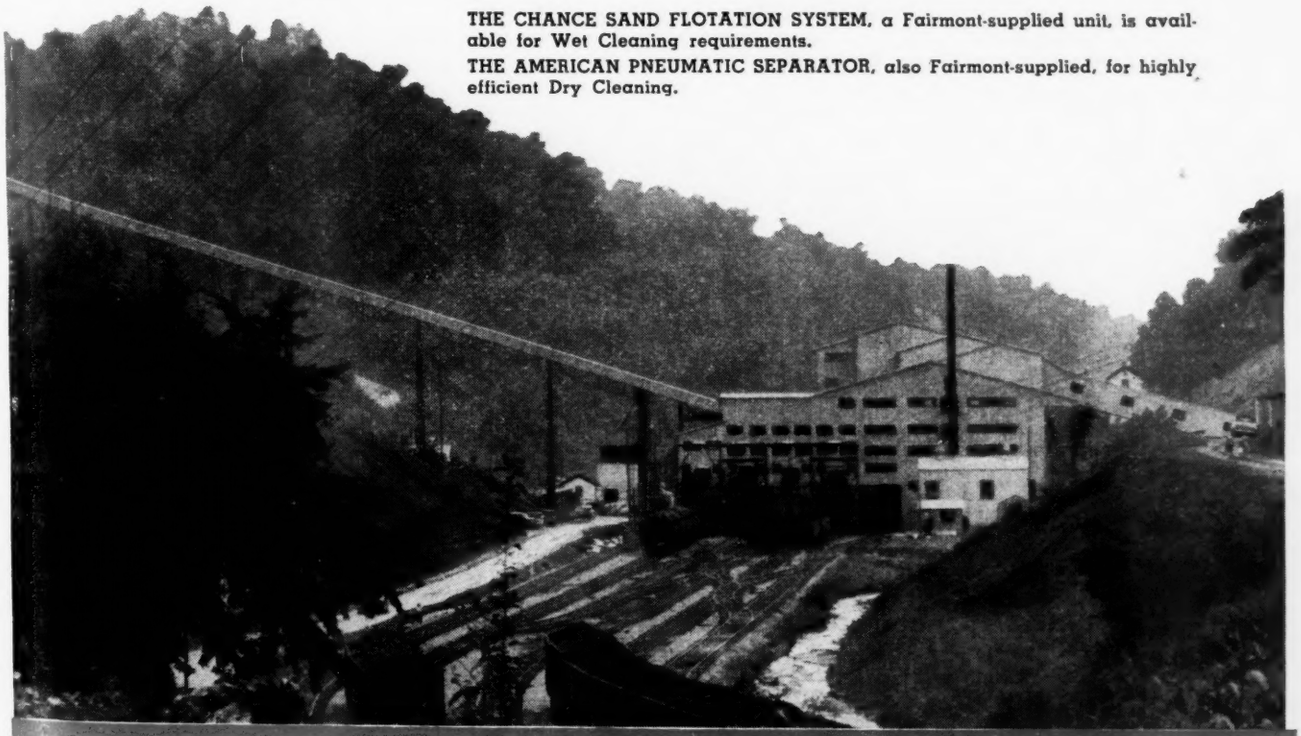
HOW WOULD YOU LIKE THREE TIMES AS MANY BUYERS FOR YOUR COAL?

You can increase your market . . . add new customers and gain new profits, by concentrating on preparation of your coal . . . for it is specification fuel that is attracting buyers in the premium price markets! They're looking for coal that is low in impurities, high in BTU value, uniform in quality—and you can supply coal to meet those qualifications by arranging with FAIRMONT now to rejuvenate your present preparation methods—or to design and install complete new preparation systems.

FAIRMONT Engineers are ready to discuss with you methods of handling and treatment that will increase the market possibilities of your coal. FAIRMONT supplies and installs Chance Sand Flotation System for Wet Cleaning and the American Pneumatic Separator for Dry Cleaning. Full particulars on both systems will be sent on request. Write to FAIRMONT MACHINERY COMPANY, Fairmont, West Virginia.

THE CHANCE SAND FLOTATION SYSTEM, a Fairmont-supplied unit, is available for Wet Cleaning requirements.

THE AMERICAN PNEUMATIC SEPARATOR, also Fairmont-supplied, for highly efficient Dry Cleaning.



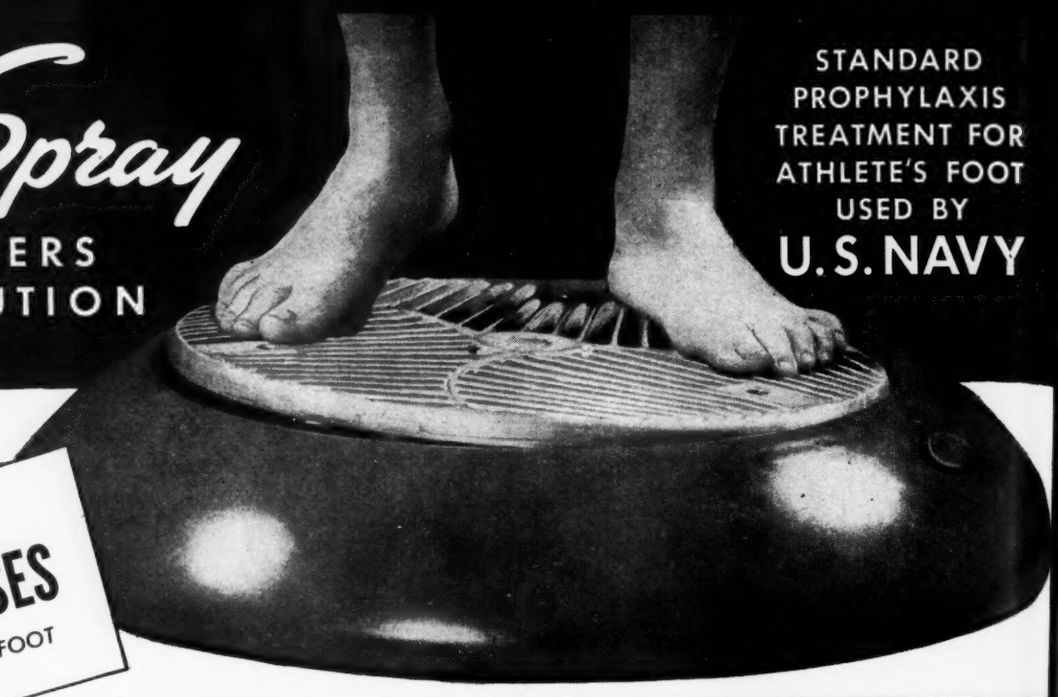
TRADE MARK REGISTERED

FAIRMONT MACHINERY COMPANY

Peda-Spray

DISPENSERS AND SOLUTION

STANDARD PROPHYLAXIS TREATMENT FOR ATHLETE'S FOOT USED BY **U.S. NAVY**

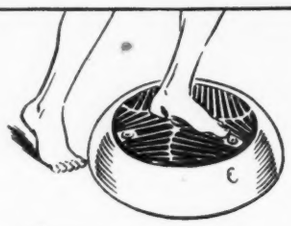


Equip your

CHANGE HOUSES

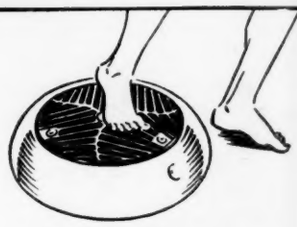
KEEP DOWN ATHLETE'S FOOT

HANDLES CROWDS AS FAST AS THEY RUN FROM SHOWERS. ASSURES COMPLETE PROPHYLAXIS IN THREE SECONDS.



1 User steps on Peda-Spray Dispenser, which automatically starts Spraying Feet at First Pressure.

2 Quick Side-to-Side Foot-Pressure sprays feet completely in 2 or 3 "left-right" movements.



3 3-Second Application of Peda-Spray is completed "in stride." User makes way for next.

Peda-Spray's Effectiveness Recognized by High Authorities . . .

Peda-Spray is used by U. S. Navy and Army.

As a Public Health Measure, Peda-Spray manufacture was recommended to WPB in September, 1944, by the National Research Council, composed of representatives of the Army, Navy and U. S. Public Health Service.

Our rapidly growing list of users includes names nationally prominent among American industries, colleges, hotels, clubs and institutions.

What Peda-Spray Is . . .

"Peda-Spray" is the name of the Self-Contained Dispenser, and of the Solution used in the Dispenser.

Peda-Spray *Dispenser* is built under U. S. Navy specifications. The base is 13-Gauge cold-rolled carbon steel, bonderized. The base contains the Solution, 3 pressure-activated pumps, and an aluminum grill on a fulcrum steel shock-spring. The Peda-Spray Dispenser is 20-Year Guaranteed.

The modern scientific way to combat

ATHLETE'S FOOT

What Peda-Spray Does . . .

Peda-Spray provides the *only automatic* prophylaxis treatment for athlete's foot. The Dispenser is completely self-contained. The weight of the user operates it. An atomized vapor spray is forced through grating, instantly covering feet and ankles. *Each user gets an individual treatment of fresh, full-strength solution. There can be no contamination or dilution of the solution.*

Peda-Spray Solution is a special formula, accepted for use, after exhaustive tests, by the U. S. Navy Medical Department and accepted under the Pure Food and Drug Act.

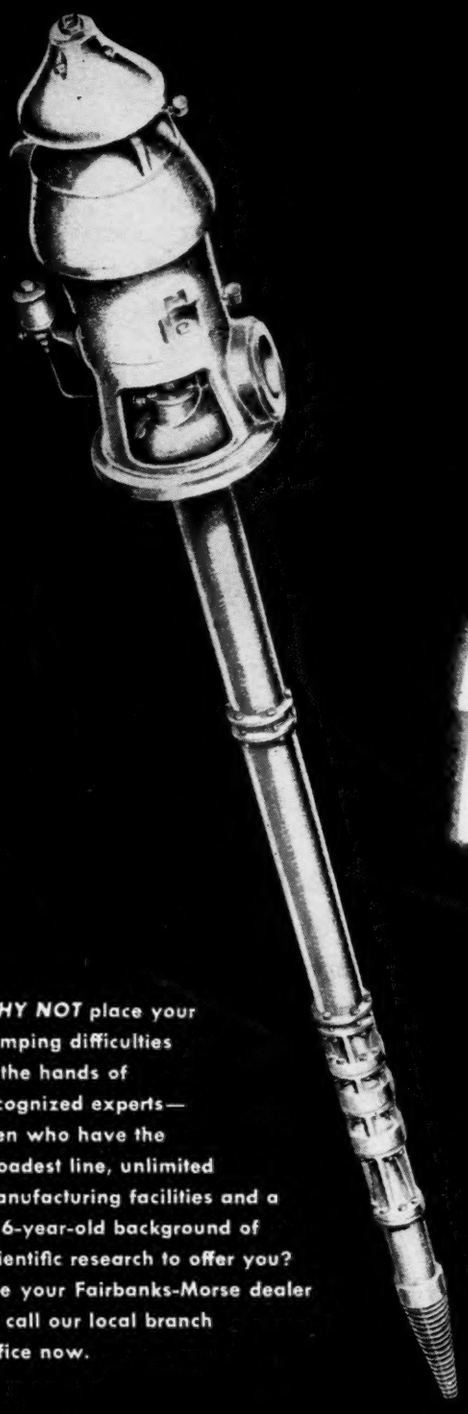
[Let us send you more detailed information about Peda-Spray...Write, at once, to Peda Spray Company, Inc., 55 West 42nd St., New York 18, N. Y.]

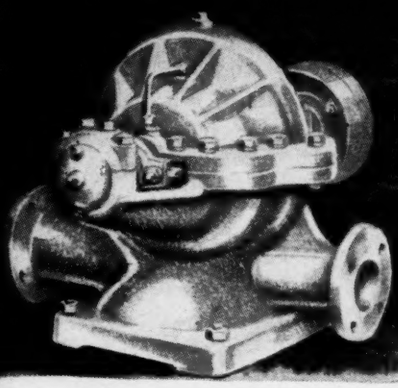
3200 Treatments to a Gallon
No Pans to Change
Less than 1/3 of a cent
Per Treatment
One Filling Lasts Months

Peda-Spray

The 3 second foot prophylactic

20-Year
FREE Guarantee
—as Long as
Peda-Spray Solution
Is Used

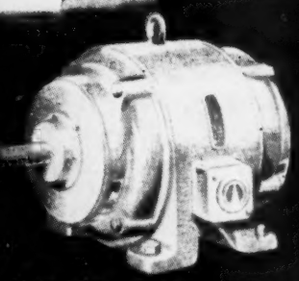




It's a family matter!

Yau can bring the widest variety of problems about fluids-moving to Fairbanks-Morse—*and keep them in the family!* Here's a single source—world-known and pump-wise—of proved pumping equipment, including the largest to the smallest centrifugals, vertical turbines and a broad line of special application types.

WHY NOT place your pumping difficulties in the hands of recognized experts—men who have the broadest line, unlimited manufacturing facilities and a 116-year-old background of scientific research to offer you? See your Fairbanks-Morse dealer or call our local branch office now.



SILENT MEMBER—An added advantage is the line of electric motors designed and built by Fairbanks-Morse—for use on Fairbanks-Morse pumps. *They cut your pump selection job in half*—give you a pump manufacturer ready to take *all* the responsibility in selecting your pump and the power to operate it!

OUT OF THE HOLE—Fairbanks-Morse and Pomona deep-well turbine pumps have long been at home in bringing water out of the hole at rock-bottom cost—on farms, factories and wherever vertical turbines are used.

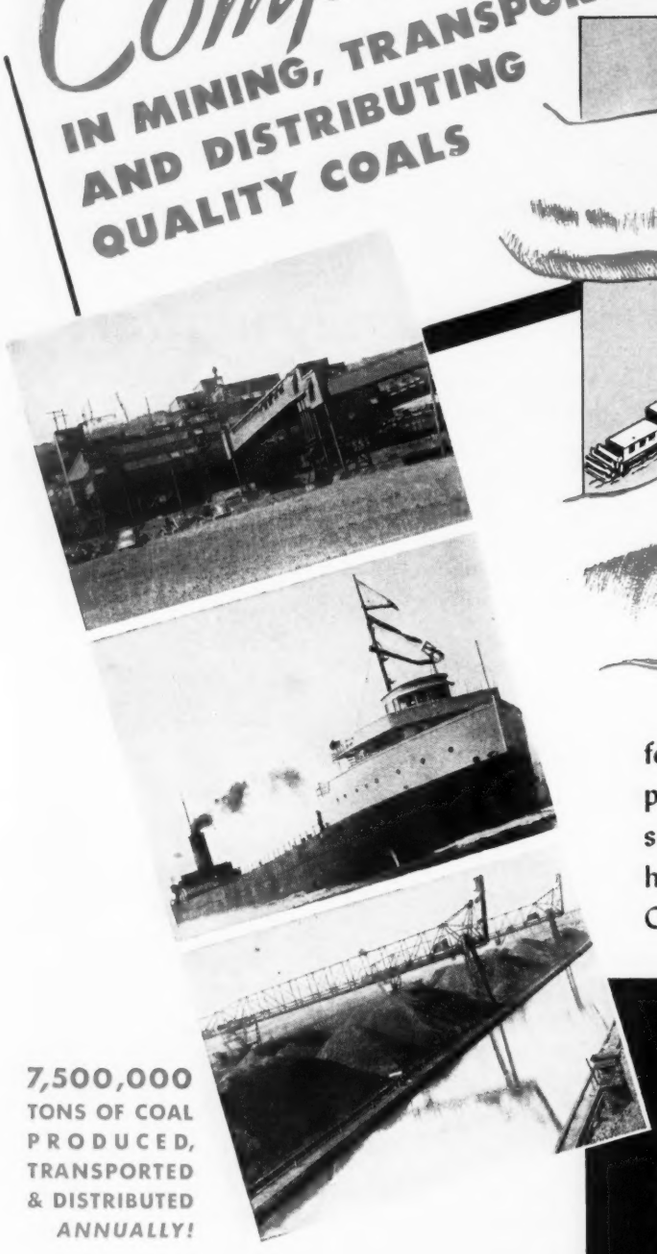
FAIRBANKS-MORSE

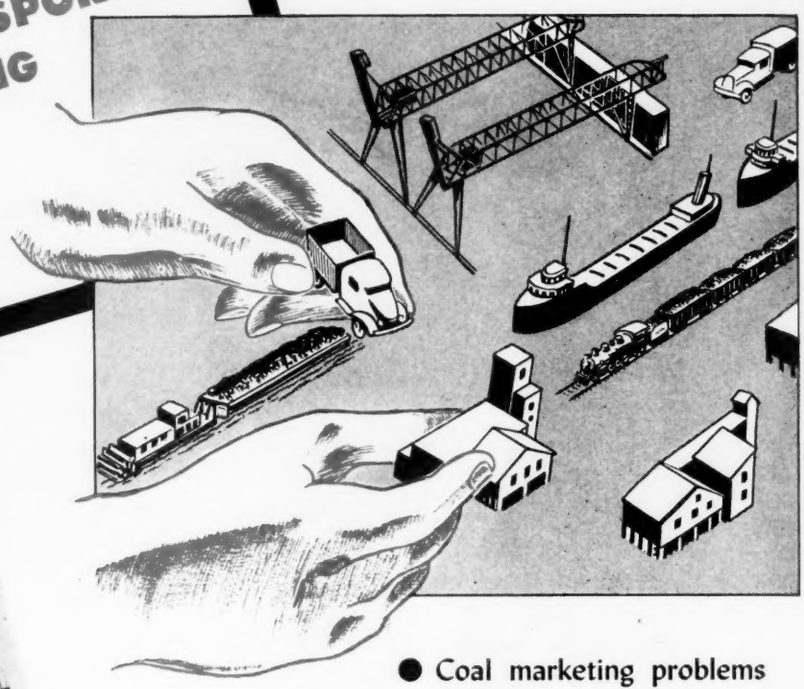
A name worth remembering

DIESEL LOCOMOTIVES · DIESEL ENGINES · MAGNETOS · GENERATORS · MOTORS · PUMPS
SCALES · STOKERS · RAILROAD MOTOR CARS and STANDPIPES · FARM EQUIPMENT

Completeness

IN MINING, TRANSPORTING AND DISTRIBUTING QUALITY COALS





● Coal marketing problems of today and tomorrow call for continuous improvement in mining, transportation and selling facilities. Only by achieving such "completeness" can the fuel needs of homes and industries throughout 26 states and Canada be adequately and efficiently served.

7,500,000
TONS OF COAL
PRODUCED,
TRANSPORTED
& DISTRIBUTED
ANNUALLY!

WISCONSIN GREAT LAKES COAL & DOCK CO., MILWAUKEE, WIS. • GREAT LAKES COAL & DOCK CO., ST. PAUL, MINN. UNITED FUEL & SUPPLY CO., RACINE, WIS. • CHAMPION FUEL COMPANY, DETROIT, MICH. • FORT WILLIAM COAL DOCK CO., LTD., FORT WILLIAM, ONT. • THE VALLEY CAMP COAL CO. OF CANADA LTD., TORONTO, ONT. • KELLEY'S CREEK COLLIERY CO. • KELLEY'S CREEK & NORTHWESTERN RAILROAD CO. • KELLEY'S CREEK BARGE LINE INC. GLENDALE GAS COAL COMPANY, CLEVELAND, OHIO PENNSYLVANIA & WEST VIRGINIA SUPPLY CORPN., THE VALLEY CAMP STORES COMPANY, WHEELING, W. VA.

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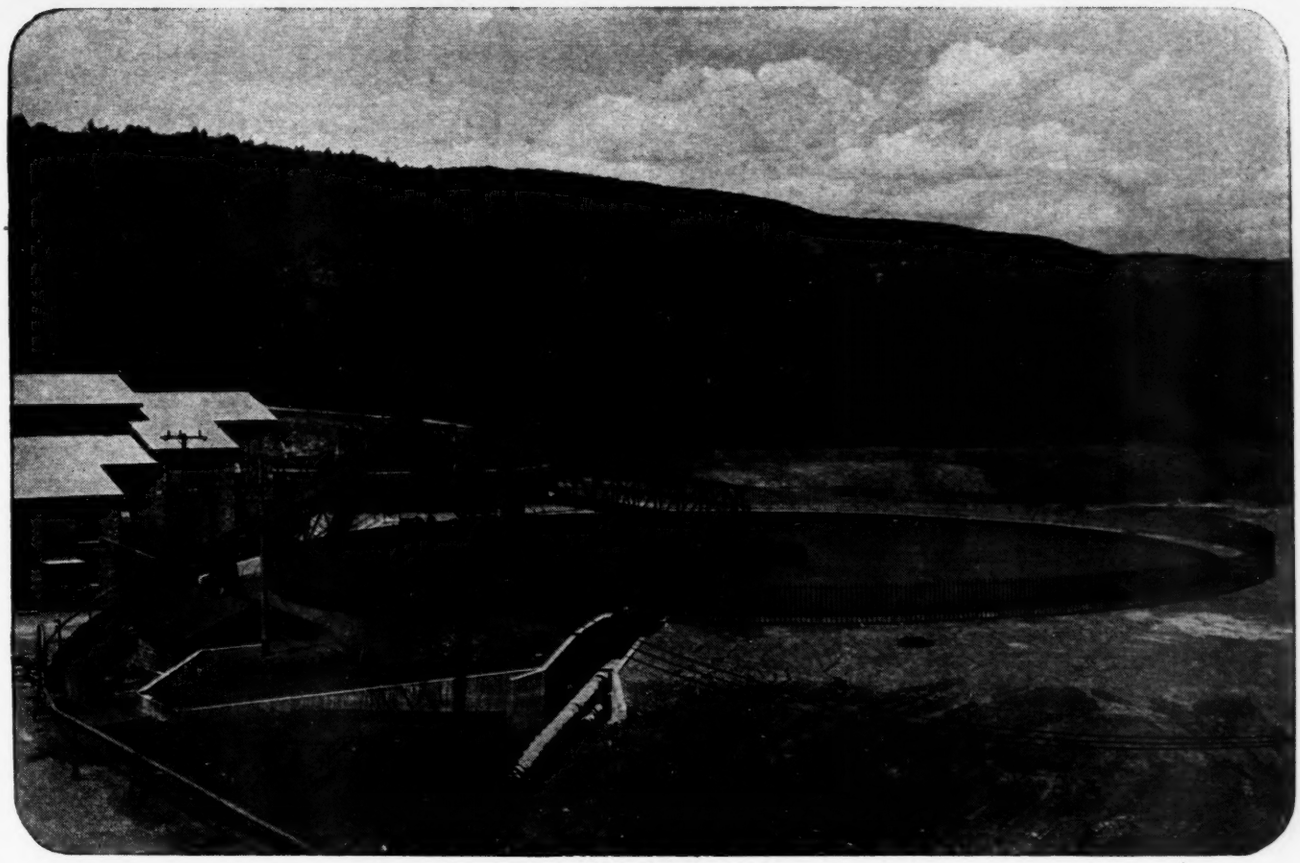
DETROIT • MILWAUKEE • ST. PAUL • SUPERIOR, WIS.
FORT WILLIAM, ONT. • TORONTO, ONT.

THE VALLEY CAMP COAL COMPANY

WESTERN RESERVE BLDG. • CLEVELAND 13, OHIO



The Dorr Thickener provides a simple, economical method of eliminating stream pollution. At the same time, the Dorr Thickener accomplishes *plus benefits* which are desirable for your plant.

- It clarifies silt-laden water for re-use in washing operations—an important economy in certain locations.
- It recovers coal fines for burning, in some plants, under colliery boilers.

When considering stream pollution prevention, consider the *plus* advantages offered to you in the Dorr Thickener and proved by scores of installations in both the anthracite and bituminous fields.

A Dorr engineer will welcome the opportunity to discuss the stream pollution problem as it affects your plant.

HERE'S STREAM POLLUTION PREVENTION *with* PLUS BENEFITS

1511

Blueprint Now! FOR TOMORROW'S NEEDS

Upon request, a DORR engineer will visit your plant, study conditions and then make recommendations for equipment designed to meet your particular requirements.

DORR

RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

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RESEARCH AND TESTING LABORATORIES
WESTPORT, CONN.

SUGAR PROCESSING
PETREE & DORR DIVISION
570 LEXINGTON AVE., NEW YORK 22, N. Y.

Where You Want It... When You Want It...*

FORWARD
SIDEWARD
OR
BACKWARD

A Bucyrus-Monighan walking dragline in action is a picture of time-saving mobility as it moves about in the course of its work. It sidesteps to dig a steep highwall, then moves towards the edge of the cut to gain dumping reach and decrease swing angle; it moves back to cut clearance for the drag rope, then moves towards the cut for deep digging and clean up. It travels in whatever direction the walking shoes point, changes direction simply by swinging the revolving frame — no special steering mechanism is needed. With its exclusive rolling cam walking action, a Bucyrus-Monighan takes every step smoothly, safely, quickly. Rough or rocky ground seldom bothers because the walking shoes are mounted to pivot fore-and-aft and sidewise, thus conforming to any ground surface for a firm grip. The machine is always ready to step off in any direction necessitated by working conditions—away from slides, along the edge of steep banks, around obstructions, out of the way of trouble.

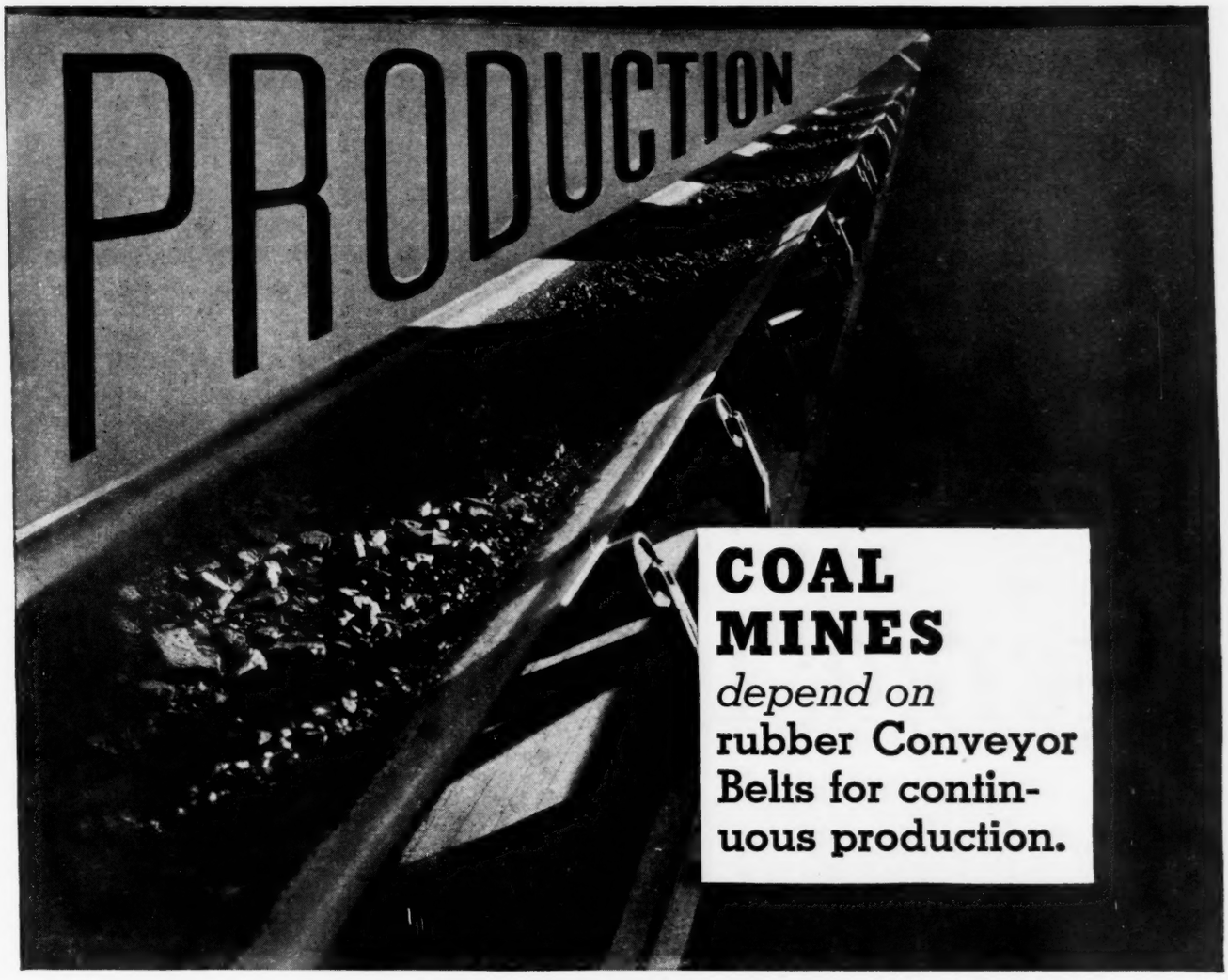
12M46

One of many reasons why

BUCYRUS-MONIGHANS ARE YEARS AHEAD

Sold by

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin



QUAKER Conveyor Belts

Are built to deliver thousands and thousands of tons of coal . . . and that is exactly what they do. Quaker has been manufacturing quality Conveyor Belting along with a complete line of Industrial Rubber Products for over sixty years.

Quaker Conveyor Belts are built of right materials, specially selected and compounded to deliver hard and long service. Experienced workmen follow every move in their construction during the entire period of manufacture including vulcanization. You really get a custom-made belt when you order a Quaker. More mines are using Quaker Products today than ever before.

It is good policy to keep on asking for Quaker . . . the name that stands for Quality Industrial Rubber Goods.

"If there is a way to get it done—Quaker will do it"

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • NEW YORK 7 • CLEVELAND 15 • CHICAGO 16 • HOUSTON 1

Western Territory

QUAKER PACIFIC RUBBER COMPANY • SAN FRANCISCO 5 • LOS ANGELES 21

MOTOR MAINTENANCE—*Today's Important Factor*

NOW, more than ever before, it is extremely necessary that the electric motors, generators, etc., which play such a vital part in our production set-up, function smoothly and efficiently. This equipment cannot be easily replaced . . . preventive steps must be taken to prolong its life and guard against burnouts and failures.

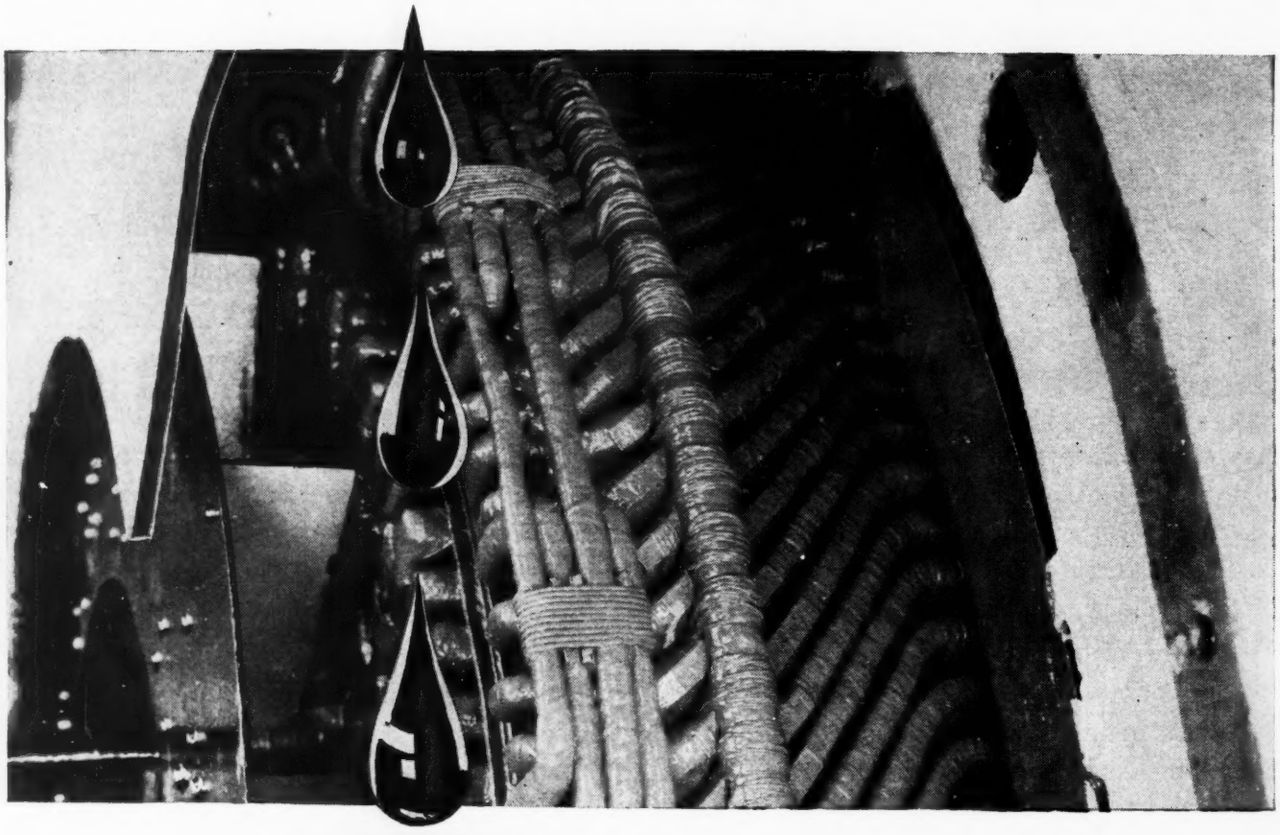
One of the prime factors contributing to motor failure is worn insulation. Holes and cracks develop in the original insulation . . . acids, oils, moisture and carbonaceous particles slowly break down the varnish film on windings . . . yet, this condition is quickly and efficiently overcome by renewing this insulation with a coat of DOLPH'S ELECTRIC LACQUER at regular intervals.

ELECTRIC LACQUER, a black air drying varnish, can be applied by either brushing or spraying. Air drying in 30 minutes, this material provides a high degree of resistance to oil, water and the abrasive action of dust particles.

The application of **ELECTRIC LACQUER** will not interfere seriously with your production, for it is not necessary to shut down electrical equipment except during the application process.

Let **ELECTRIC LACQUER** aid you in your preventive maintenance work, as it has for many others throughout industry.

ELECTRIC LACQUER * (TRADE MARK REGISTERED)

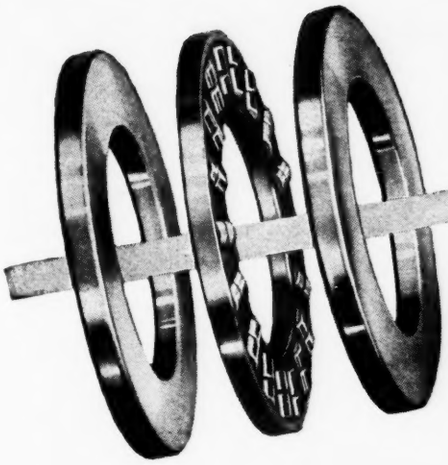


Insulating **Dolph's** *Varnish Specialists*

JOHN C. DOLPH COMPANY

168 EMMETT STREET • NEWARK 5, N. J.

The BIG SAVING
is in Man and Machine Hours



ROLLWAY
RIGHT-ANGLE LOADING

means fewer shutdowns for bearing service and replacement

In general, right-angle loading gives Rollway Roller Bearings a longer life expectancy. That's a saving in itself, but it is relatively unimportant when you consider the enormously greater savings in man hours and machine hours which this longer bearing life provides. Machines run at peak production for longer periods. Fewer skilled men stand idle while bearings are serviced or replaced. There are fewer interruptions of the production schedule.

The Advantages You Get From Right-Angle Loading

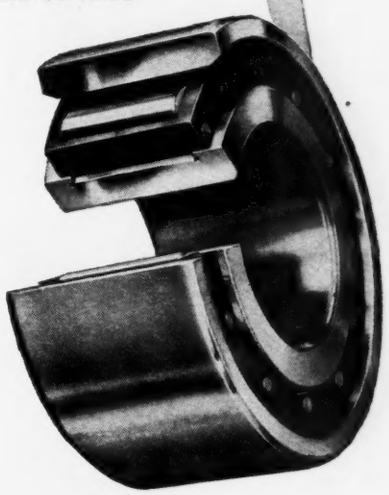
1. Solid cylindrical rollers of greater roller mass and uniform roller cross-section . . . greater resistance to shock loads and vibration . . . longer life expectancy under continuous heavy-duty service.

2. All loads carried at right-angles to the roller axis. No compound loads, no oblique loads, and no resultants of oblique loads can be brought to bear.

3. No wedging of rollers . . . no pinch out . . . less roller end-rub and wear-back . . . less rubbing friction.

4. Only pure radial or pure thrust loads can be imposed upon any single bearing assembly. Unit pressures per roller are substantially reduced.

5. Greater load-carrying capacity in any given dimension. Housings can be smaller and more compact. Weight of design can be reduced.

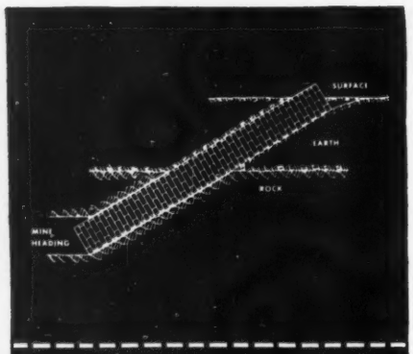


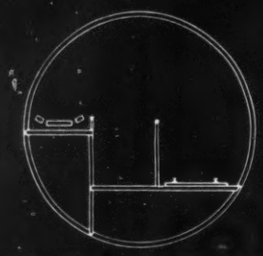
Select Bearings For the Job They Do

Our engineering specialists will gladly make necessary calculations, drawings and supply the information required for a complete understanding of the problem. No charge or obligation.

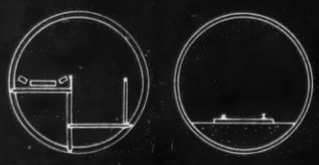
ROLLWAY CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Tulsa • Los Angeles



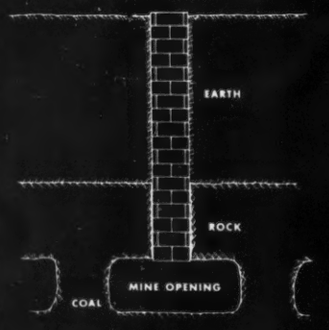


Single large circular opening made with ARMCO Liner Plates contains conveyor, walkway and track.



Building two small openings with ARMCO Plates permits using one for air intake and the other for exhaust. Left—Entry with conveyor and walkway. Right—Entry with tracks.

ARMCO Plates may be used to build single arch-type entry containing conveyor, walkway and track.



A "pay-off" idea

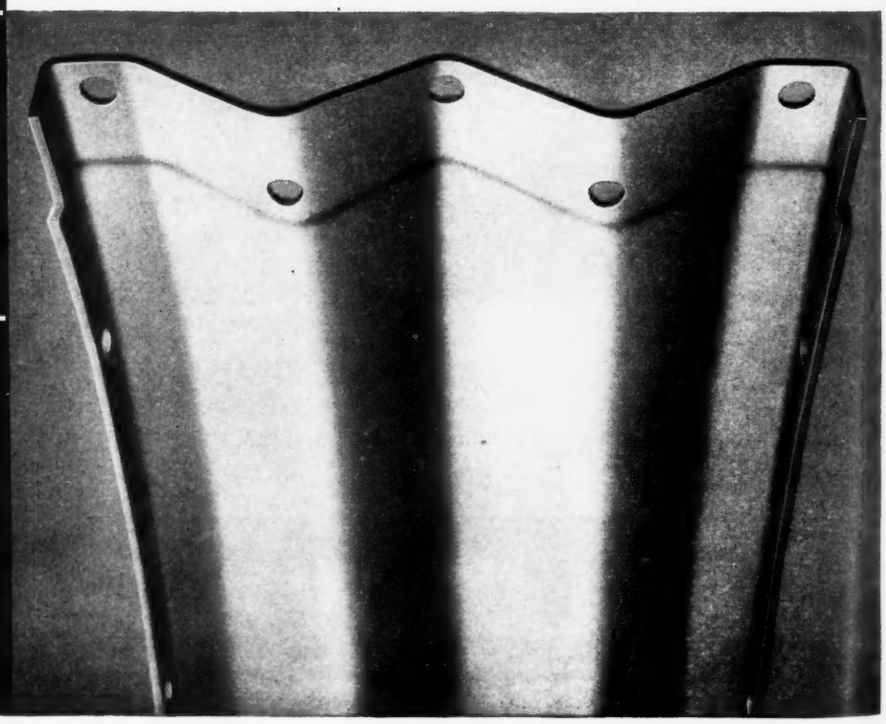
FOR THAT NEXT MINE ENTRY

Have you heard about ARMCO Tunnel Liner Plates for slope entry construction? Here's the simplest, most inexpensive way you ever saw to construct better passageways from ground surface to working levels.

These sturdy, corrugated liner plates are designed to assure safe strength without excessive bulk or weight. They provide worth-while durability and safety from fire hazards. One man can easily handle the light-weight steel sections, bolting them together with ordinary wrenches. Costs are low and the job goes fast.

You'll also find that sinking vertical shafts with ARMCO Liner Plates is an easy, economical way to provide additional ventilation and safety as active workings extend from original mine openings. Write for data on Armco's tunneling methods and ask for the new ARMCO Mining Folder. Armco Drainage & Metal Products, Inc., and Associated Companies, 2155 Curtis St., Middletown, O.

ARMCO TUNNEL LINER PLATES



In this country, progress is firmly rooted in the principle that cheap coal—through higher productivity—is the only means of assuring continued prosperity with good wages to miners and reasonable profits to investors.

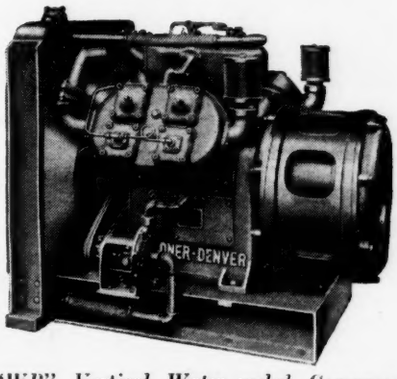
—*From Coal Age*

And here's one Good way to cut Tonnage Costs . . . .

Bigger tonnages—faster production—lower costs—these are demands placed on coal production today.

Gardner-Denver mining equipment can help you meet these demands. Power and speed have been built into this equipment to step up operations. Rugged construction assures low maintenance costs.

Increase production—cut operating costs with Gardner-Denver mining equipment. For complete information, write Gardner-Denver Company, Quincy, Illinois.



"WB" Vertical Water-cooled Compressors, compact and requiring no piping, are easily moved from location to location. Capacities range from 42 to 445 cubic feet per minute.

Powerful, 5-cylinder Gardner-Denver Radial Air Motors economically drive winches, conveyors, drills, fans, pumps and other equipment. They are used to good advantage where electric or gasoline power is impractical.

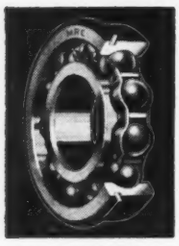
Gardner-Denver Hand-held Drills are balanced for easy handling. Their exceptional hole-cleaning ability keeps the bit free of cuttings. Fast, powerful blows speed the drilling.

Continuous Feed Drifting Drills automatically feed the drill steel to suit the ground—little attention is required from the drill runner. These Continuous Feed Drifters have perfect balance between air consumption, rate of penetration and rotative power—vibration is reduced—maintenance costs and time cut to the minimum.

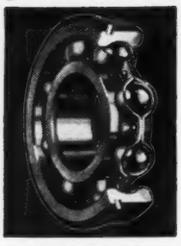
Since 1859
GARDNER-DENVER

M-R-C BALL BEARINGS

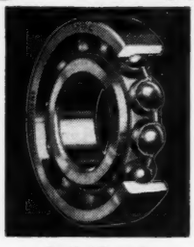
Complete Range of Types for All Requirements



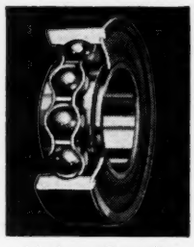
Maximum-Capacity Snap-Ring Type



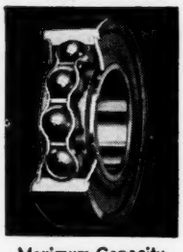
Super-Conrad Snap-Ring Type



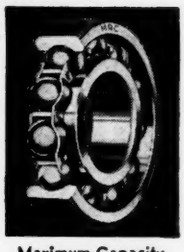
Radial Type R Maximum-Capacity



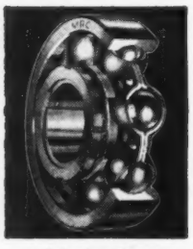
Maximum-Capacity Single-Shielded



Maximum-Capacity Double-Shielded

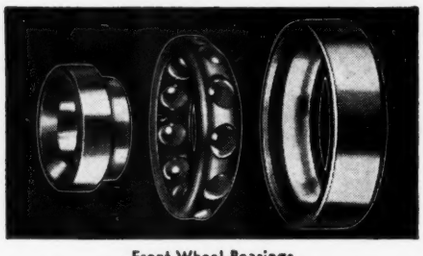


Maximum-Capacity Notched Type

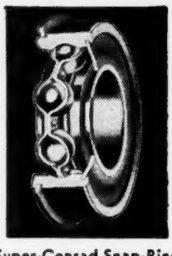


Adapter Type

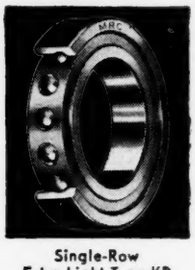
Radio-Thrust Angular-Contact



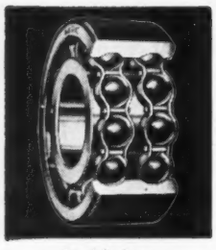
Front Wheel Bearings
Inner Race — Ball Retainer — Outer Race



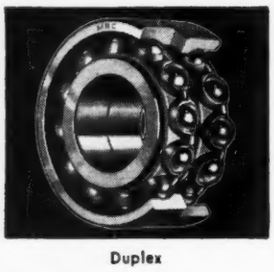
Super-Conrad Snap-Ring Type Single-Shielded



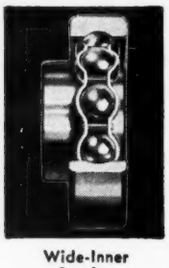
Single-Row Extra-Light Type KR



Double-Row Maximum-Capacity Type

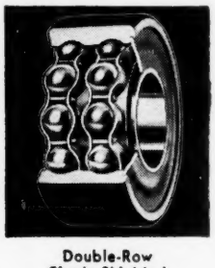


Duplex

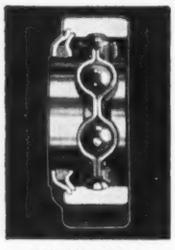


Wide-Inner Bearing

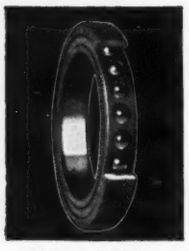
Thrust Bearing Flat Washer Type



Double-Row Single-Shielded



Fabri-Seal Type with Sealing Ring



Extremely-Light Inch-Size

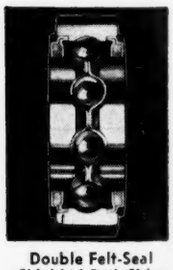
"M-R-C BALL BEARING INTERCHANGEABLE TABLES"

Ball Bearings of Various Makes in Numerical Order and Corresponding Sizes of M-R-C Replacements.

This bulletin contains a list of bearing numbers of over 12,000 different ball bearings made by various American ball bearing manufacturers.

Sent free on request — Ask for Bulletin No. 26

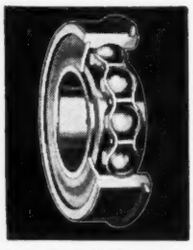
Extra-Small (Miniature)



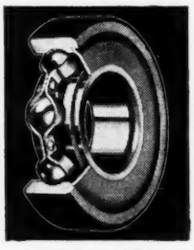
Double Felt-Seal Shielded Both Sides

Narrow-Type Bearing

Super-Conrad Deep-Groove Type

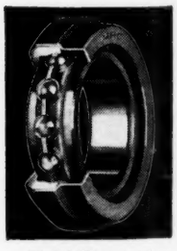


Max.-Capacity Snap-Ring Type Single-Shielded



Super-Conrad Type Single-Shielded

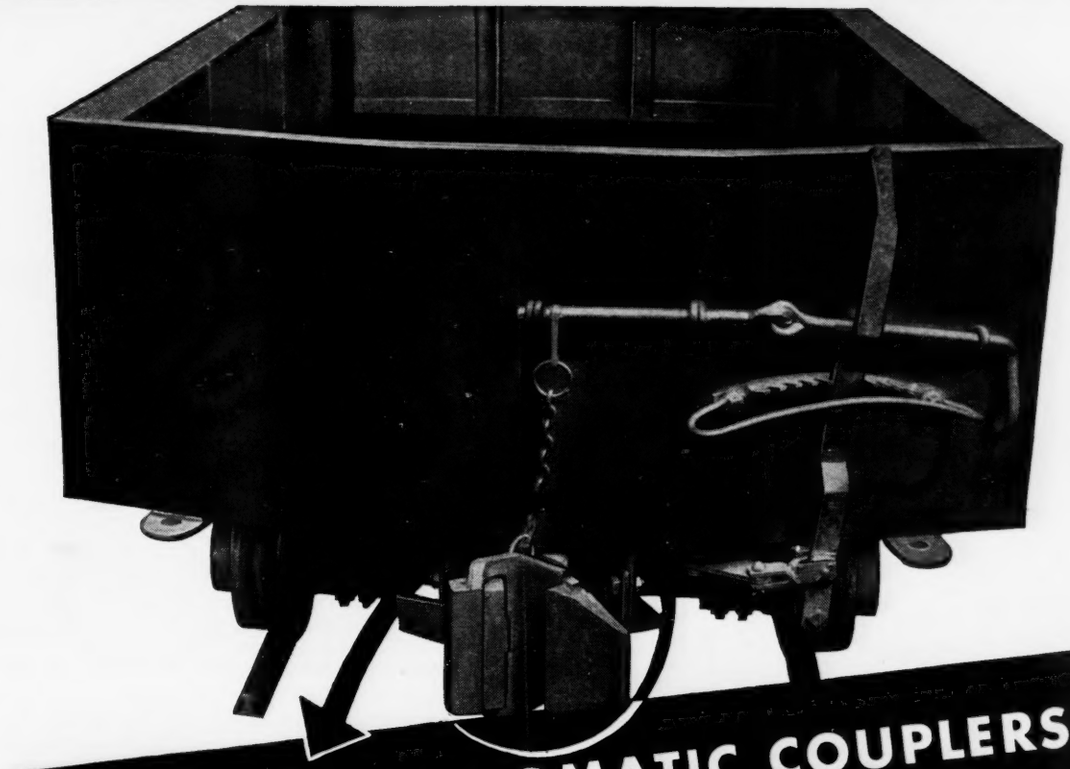
Clutch Throw-out Plain



Clutch Throw-out with Housing

MARLIN-ROCKWELL CORPORATION

Executive Offices: JAMESTOWN, N. Y.



WILLISON AUTOMATIC COUPLERS
for safety . . . speed . . . less cost per ton

Allegheny Pittsburgh Coal Company, already a leader in mine mechanization, is extending its program. They recently installed 300 new 8-wheel, 7½-ton cars, built by Irwin Foundry & Mine Car Company, and equipped with Willison Automatic Couplers. (Rotary coupler on one end, with non-rotary on opposite end.)

Use of Willison Automatic Couplers will result in such advantages as:

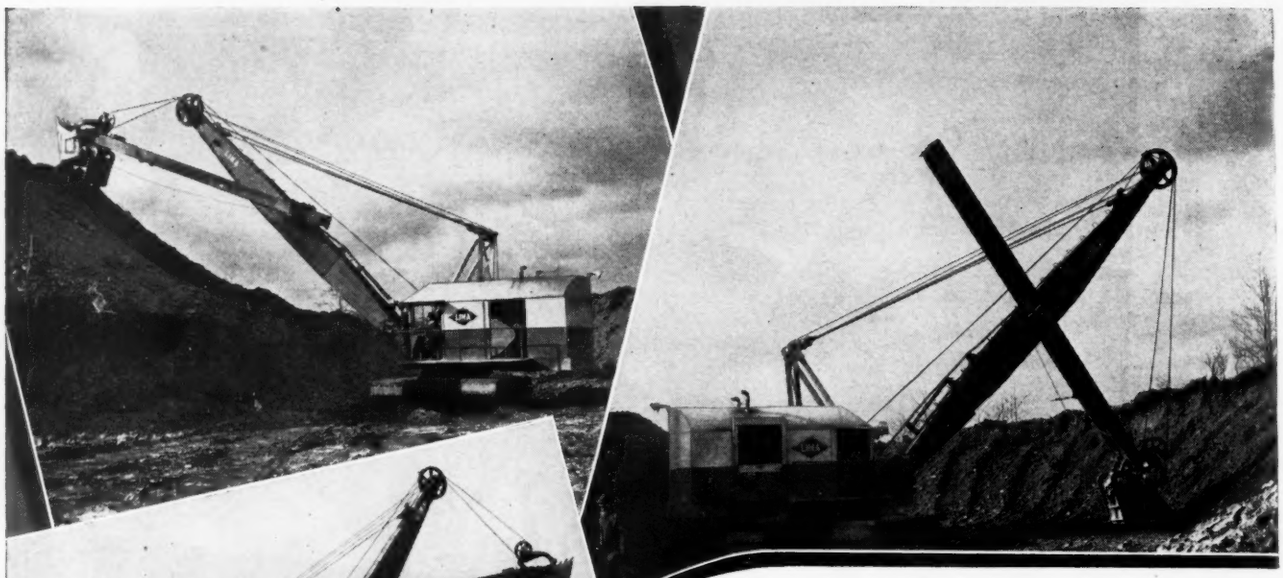
- **Safer operation—coupling and uncoupling without going between cars.**
- **Operation around sharp curves as low as 14′ radius.**
- **Faster handling of large capacity cars.**
- **Faster shunting and gathering.**
- **Less coal spillage.**
- **No uncoupling on rotary dumps.**
- **Faster operation on non-rotary dumps.**

For your mechanization program, Willison Automatic Couplers will pay their own way. We suggest consultation with your car builders or with our engineers.

EST. M&N Co 1868

NATIONAL MALLEABLE
& STEEL CASTINGS COMPANY
CLEVELAND, OHIO

Sales Offices: NEW YORK, PHILADELPHIA, RICHMOND, ST. LOUIS, SAN FRANCISCO
Works: CLEVELAND, CHICAGO, INDIANAPOLIS, SHARON, PA., MELROSE PARK, ILL.



Greater tonnage quotas and lower production costs are being met with LIMA stripping shovels and draglines, because they have the advantages that operators must have to insure a smooth, continuous flow of coal to the tipple. Their long booms and dipper handles, and fast filling dippers and buckets, make wide, deep cuts possible with overburden cast high and far back from the cut. LIMA *"Precision"* air control takes fatigue out of operating, no tugging at levers to cut down the efficiency of the operator; independent clutches make possible simultaneous operations; anti-friction bearings reduce friction and make for smoother, more efficient operation. Consider these profitable LIMA features the next time you buy a shovel or dragline. Remember too, when you buy a LIMA, you are buying a product recognized for its outstanding quality and satisfactory service in operation.

Write today for a copy of Bulletins describing LIMA Stripping Shovels and Draglines

LIMA LOCOMOTIVE WORKS, INCORPORATED

Shovel and Crane Division **LIMA, OHIO**

NEW YORK, N. Y. ST. LOUIS, MO. DALLAS, TEXAS SEATTLE, WASH.
NEWARK, N. J. MINNEAPOLIS, MINN. MEMPHIS, TENN. SPOKANE, WASH.
LOS ANGELES, CALIF. SAN FRANCISCO, CALIF. PORTLAND, OREGON

LIMA

LIMA

SHOVELS ¾ YARD TO 5 YARDS DRAGLINES – VARIABLE CRANES 13 TONS TO 100 TONS

A balanced combination of Service Capacities makes REPUBLIC CONVEYOR BELTING *Real Coal Mining Equipment*

● Variety rather than intensity of any one form of service abuse characterizes conveyor belt operation in coal mining. On-the-spot and laboratory analysis by Republic technologists have resulted in balanced belt constructions with unusually versatile properties, especially suited to coal mining requirements. Structural elements that harmlessly cushion effects of impact and resist abrasion are combined, in proper proportion, with special properties that resist deterioration from mildew and aging under conditions in and around mines. Nothing is overlooked that will preserve the reputation of Republic Conveyor Belts as real coal mining equipment. . . afford longer service in this specific field. Consult your Republic Distributor on your next replacement or new installation.

WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION

Photograph courtesy of La-Del Conveyor & Mfg. Co., New Philadelphia, Ohio

REPUBLIC RUBBER

DIVISION

LEE RUBBER & TIRE CORPORATION

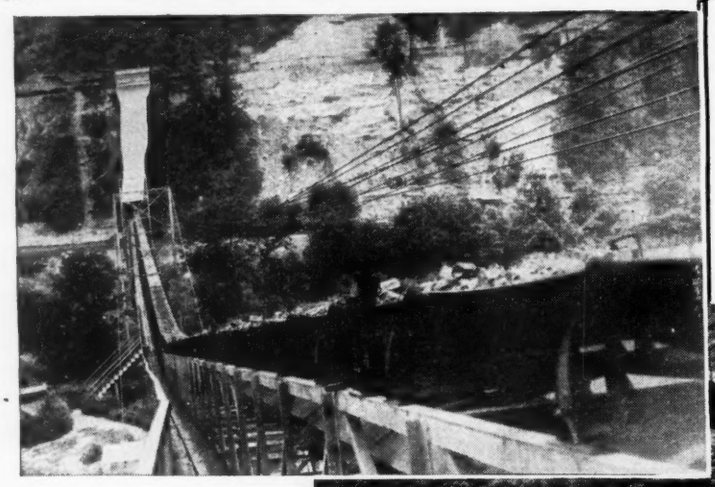
YOUNGSTOWN 1, OHIO

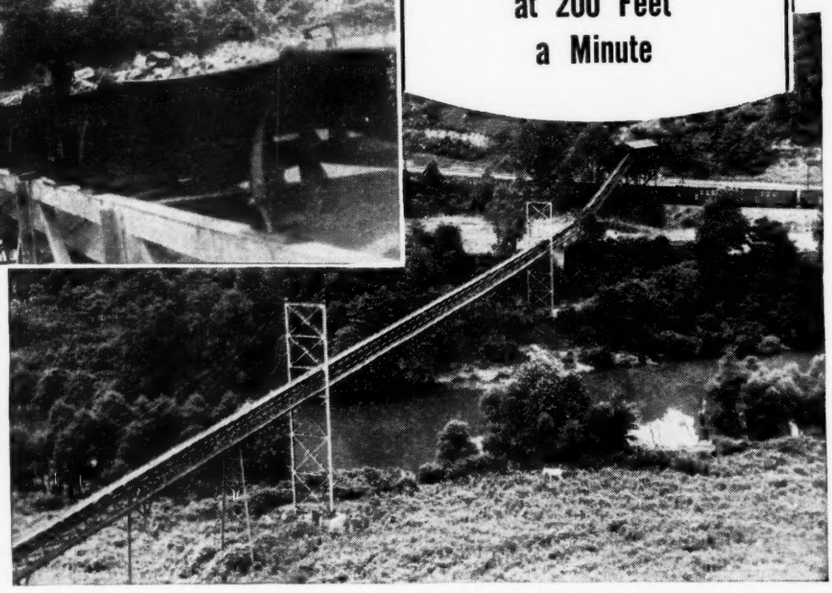
REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN, O.

LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN, PA.

Kentucky to West Virginia on a Continental Conveyor

200 Tons an Hour of Run-of-mine Coal Carried 680 Feet at 200 Feet a Minute





Continental Idlers

A complete line of Troughing, Flat Belt and Picking Table Idlers, Timken or SKF equipped, for belts 14 to 60 inches wide. Also a complete line of accessories, including Trippers, Pulleys, Take-ups, Drives, etc.

Write for Bulletin ID-105

When the Belfry Coal Company opened a new mine in Kentucky, they were faced with the problem of hauling the coal across the Tug River to the C & O Railroad in West Virginia. Many methods were considered, but it soon became apparent to company engineers that a belt conveyor carried on a suspension bridge was the most practical solution.

Continental engineers then designed the system pictured above on which run-of-mine coal is uniformly fed by an apron feeder onto the 36" belt conveyor—sped across the river at 200-FPM to the tipple on the opposite embankment.

This is typical of the manner in which Continental engineering is assisting industry in solving their materials handling problems.

Many industries are taking advantage of our present day stocks to build complete conveyors. Send us your orders or inquiries.

100A

INDUSTRIAL DIVISION

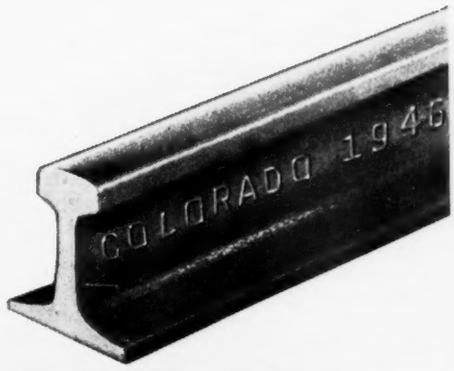
CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

ATLANTA • DALLAS • MEMPHIS

GET ON THE RIGHT TRACK

Since 1882 many miners have relied on CF&I for mine rails and fastenings. If you're on COLORADO MINE RAILS, you are on the right track for fast, continuous, heavy haulage.



ANTICIPATE YOUR REQUIREMENTS AS FAR IN ADVANCE AS POSSIBLE. • THIS WILL ENABLE US TO SERVE YOU.

The Colorado Fuel and Iron Corporation

GENERAL OFFICES:—DENVER, COLORADO STEEL WORKS: PUEBLO, COLORADO

In the Mine . . . in the Preparation Plant . . . in the Power Plant

Warren Pumps
increase capacity
lower maintenance costs
save power

A Pennsylvania mine replaced two other pumps with one Warren pump. In four years, power savings alone amounted to $10,105 . . . savings in maintenance costs had totalled more than the original cost of the pump.

Another mine faced the problem of pumping 50% more gallons per minute. The question was whether to replace the existing pump with a larger one or to add a second pump. The answer: The original was replaced with a Warren which now uses the same motor and delivers 2400 g.p.m. in contrast with the 1600 g.p.m. of the other pump . . . with no increase in power requirements.

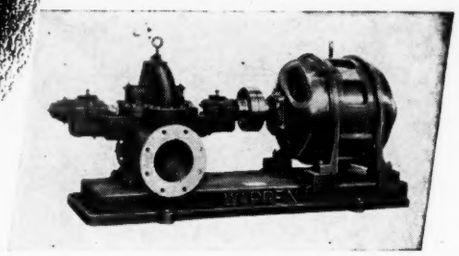
These instances are not unusual. Warren produces results because of an intimate knowledge of mine requirements and highly specialized experience in building pumps.

There is a Warren representative near you. Why not get his suggestions on your problem? Write . . .

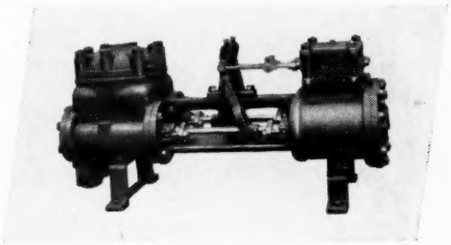
Warren Steam Pump Company, Inc.
WARREN, MASSACHUSETTS

Atlanta Boston Chicago Cleveland Denver Detroit Houston
Hartford Los Angeles Minneapolis New Orleans New York
Philadelphia Pittsburgh Richmond San Francisco Seattle St. Louis

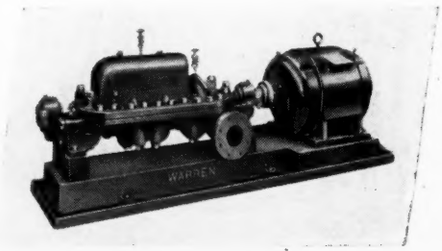
CA-1



Warren DM and DL, single stage, double-suction centrifugal pumps are widely used in mines and preparation plants. Special metals, capacities, heads, etc., are available to meet any operating conditions. Complete description in Bulletin 227.

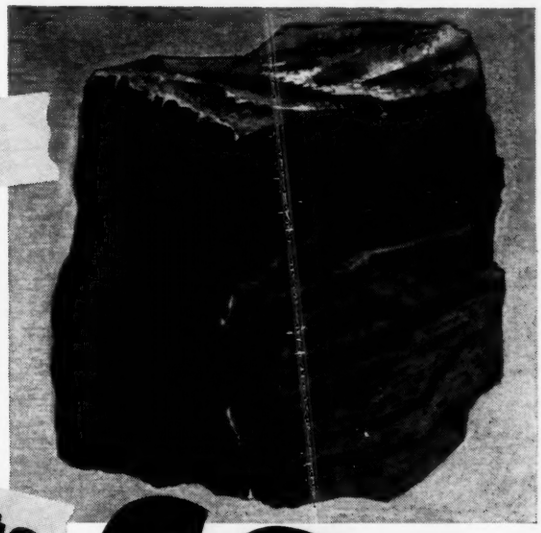


The "Realwear" is one of the Warren pumps used in power plants. New standard features are: Molded Piston Cup Packing, Stainless Steel Durabla Valves, Stainless Steel Piston Rods and All-Steel Valve Gear. The TM type (below) is used in plants having higher boiler pressure than could be handled by the "Realwear" steam pump. Write for information.



Warren Pumps

CALCIUM CHLORIDE



Dustproofs and Protects COAL

1 Makes Coal Clean and Dustless.

2 Keeps coal from freezing in car and pile, in truck and storage bin.

3 Protects both domestic and industrial coal by reducing wind losses, deterioration of grades and protects against spontaneous combustion.

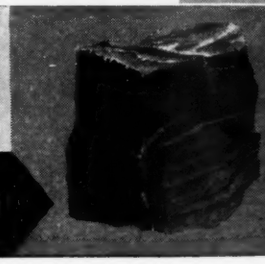
4 It is odorless and easy to apply.

5 Helps to make coal a clean preferred fuel to meet revived postwar competition.

Our Literature Tells How • Please Write for it

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Bldg. • Detroit 26, Mich.

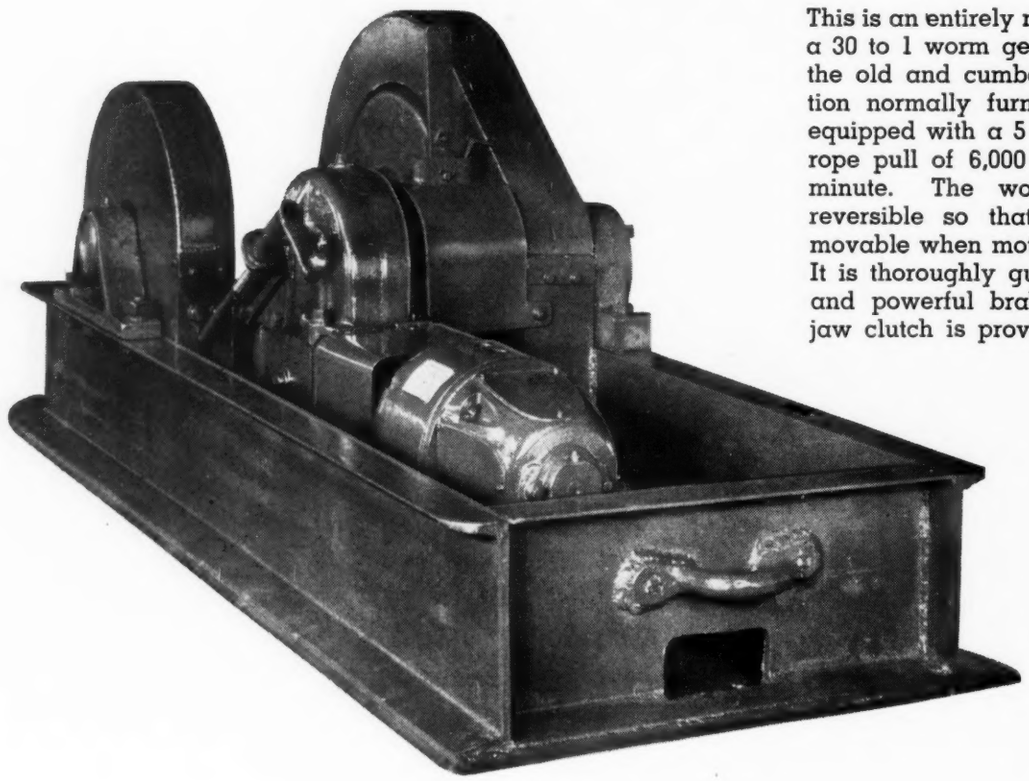
CALCIUM CHLORIDE



FREEZEPROOFS AND DUSTPROOFS IN 1 OPERATION

NEW

"Flood City"
CAR SPOTTING HOIST



This is an entirely new design in which a 30 to 1 worm gear reducer replaces the old and cumbersome gear reduction normally furnished. The unit is equipped with a 5 HP motor, giving a rope pull of 6,000 lbs. at 35 feet per minute. The worm drive is non-reversible so that the drum is immovable when motor is at a standstill. It is thoroughly guarded at all points and powerful brake mechanism and jaw clutch is provided.

The Flood City line includes a variety of brass, bronze and aluminum castings for mechanized mining. Parts can be furnished for all standard mining equipment including General Electric, Westinghouse, Jeffrey, Goodman etc. Flood City also maintains a complete electrical shop and machine shop service for building and repairing all types of mining equipment.

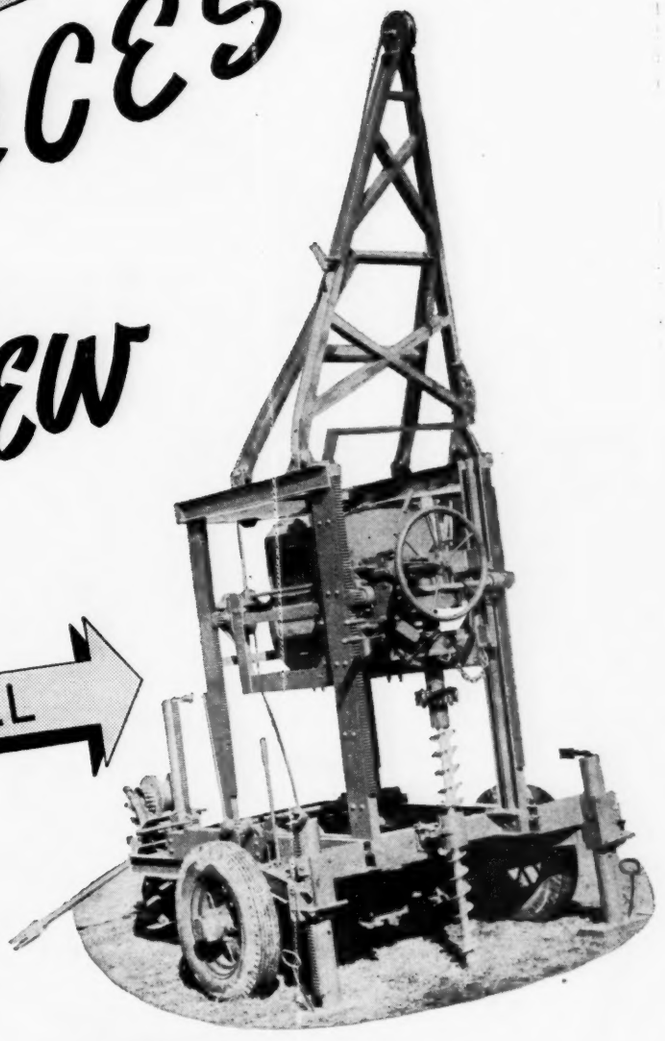
Send for complete information today. Bulletin material on special items is available on request.

FLOOD CITY
BRASS & ELECTRIC CO.
JOHNSTOWN PA.
Branch—CHARLESTOWN W. VA.

Brass, bronze and aluminum castings, electrical repairs, mine equipment

Parmanco

Announces The New



VERTICAL DRILL

With a shifting frame eliminating the necessity of moving the drill for pulling augers and taking samples, an improved chuck allowing complete power lift for uncoupling, a new 25 H.P. motor and with feed worm-gears running in oil. These are design improvements that in field tests have proven a 33 1-3% cut in drilling and sampling time.

HORIZONTAL DRILL

With a positive two-speed feed-control — using only 1½ H.P. of the new 25 H.P. engine — through a clutch and transmission which completely eliminates oil-leak maintenance and cuts drilling time 50%. Finger-tip feed-control and traction-equipped.

PARIS MANUFACTURING COMPANY

PARIS, ILLINOIS

PARKERSBURG HYDROTARDER means greater safety and lower operating costs for truck operators

Hauling heavy loads down steep grades presents two major problems of truck operation which the HYDROTARDER has solved for scores of operators.

Truck speed on down grades is controlled without the use of mechanical brakes, transmission or engine. The descent is made at a safe, uniform speed, with the truck under complete control at all times. Trucks have been able to make 25% more trips over the same route, after being equipped with Hydrotarder.

Operators have saved as much as $100.00 per month per truck, on brakes alone. Tire savings are as high as 25% with an 8% saving in fuel. The result of these savings is that Hydrotarder pays for itself in a short time . . . continues to keep your truck operating costs low . . . safety high.

Write your nearest distributor for the full and interesting story about how Hydrotarder can lick your braking problem . . . increase the number of round trips per truck while reducing operating costs.

Parkersburg HYDROTARDER

THE PARKERSBURG RIG & REEL COMPANY
PARKERSBURG, W VA.

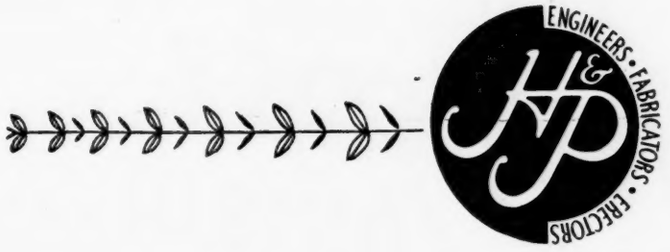
Manufacturers since 1931 of the famed Hydromatic Brake—the load retarder which makes possible the drilling of deep oil wells safely and economically. Its counterpart, the Hydrotarder, enables motor transportation to operate with greater safety, economy, and speed than was ever heretofore believed possible.

Distributed by

HETZEL BROTHERS
Engineers and Manufacturers
1972 Los Angeles Street, Los Angeles 11, California

THE WINTER-WEISS COMPANY
22nd and Blake Sts., Denver 2, Colorado

The Pointer-Willamette Company
238 N. E. Oregon St., Portland 14, Oregon



what is a coal preparation plant?

IT IS A PLANT where raw coal of given characteristics is processed so that when loaded for shipment the coal has the requisite analyses and qualities for a given market.

For forty years Heyl and Patterson has been engaged in the design and building of coal preparation plants that fulfill this basic conception.

During all these years Heyl & Patterson has been in close contact with the complete range of operations involved in processing raw coal—dumping, picking, crushing, sizing, cleaning, mixing, blending, loading . . . .

Because of this overall experience, Heyl & Patterson is in an exceptional position to design and build your new coal preparation plant or modernize your existing plant. We shall be glad to consult with you when you plan for better coal.

HEYL & PATTERSON, INC.

55 WATER STREET · PITTSBURGH 22, PA.

FOR *LOWEST COST* MINE SEEPAGE CONTROL...

. . . The MARLOW "Improved" Mine Gathering Pump!

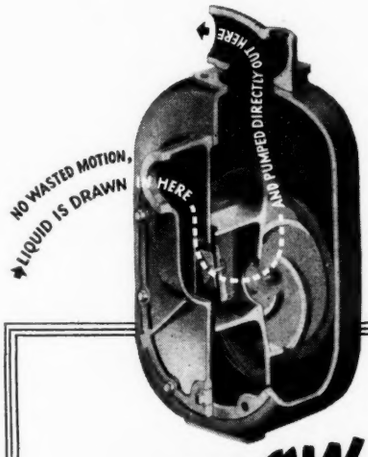
Now you can have the famous Marlow self-priming centrifugal—the fastest priming pump yet developed—to help you have better seepage control and lowest cost mine drainage.

Thrifty, Fast, Powerful

Marlow Pumps, makers of the world's most efficient self-priming centrifugal, now has engineered a new, improved pump specially for mines. The Marlow Type EM mine gathering pump includes all the outstanding advantages of the Marlow self-priming centrifugal line. It self-primes on lifts to 25 feet, and has no ports, by-passes or any of the other auxiliary devices that reduce efficiency and cause troubles in many ordinary self-priming centrifugals. There is no recirculation or wasted motion. The impeller alone moves the liquid. Its simple efficient design prevents clogging, jamming or other problems. It will pump more water per horsepower than any other.

- Water contact parts made of special acid-resistant alloys for use in acid or sweet water mines.
- Sled-type base and low height permit easy positioning.
- Discharge tee can be positioned in any of four horizontal directions, 90 degrees apart, for greatest operational convenience.
- Replaceable labyrinth ring overcomes abrasive effect of dirty water on packing.
- Stainless steel studs eliminate corrosion . . . simplify servicing.
- Open type impeller is specially designed to prevent clogging.
- Both impeller and diffuser can be replaced at very low cost and pump fully restored to original high efficiency.
- The new Marlow mine gathering pump is the result of the experience gained from years of operation of Marlow Pumps in mines. You can depend on it for efficiency, economy and low maintenance.

Write for Bulletin No. EM 46 and name of nearest distributor.



MARLOW PUMPS
RIDGEWOOD, N.J.

★ *Makers of the world's largest line of Self-Priming Centrifugal Pumps.*

WATT TRANSPORTATION MEANS EFFICIENCY

CUSTOMERS REPORT COMPLETE SATISFACTION WITH THEIR WATT MINE CARS FROM STANDPOINT — EFFICIENCY, ECONOMY AND ENDURANCE.

IT'S TO YOUR ADVANTAGE TO OPERATE WATT CARS.

WATT CAR AND WHEEL CO.

BARNESVILLE, OHIO

REPRESENTATIVES

B. E. SCHONTHAL & CO.
28 EAST JACKSON BLVD.
CHICAGO, ILL.

SCHLOSS & SHUBART
BOSTON BLDG.
DENVER, COLO.

J. E. GRAHAM,
341-12TH AVE.,
HUNTINGTON, W. VA.

Slate Removal—QUICK, EASY *with* LINN HAFTRAK

The All-Purpose Half-Track That Can Take It

10 YEARS IN SERVICE AND STILL GOING STRONG

A 15-ton load of slate is the average, regardless of weather or terrain.

A 24% GRADE DOESN'T STOP THIS OLD-TIMER

This particular haul, 3000 feet each way, is typical of Linn Performance in the anthracite and bituminous coal fields.

THE LINN MANUFACTURING CORPORATION

GENERAL SALES OFFICE
250 W. 57 ST., NEW YORK

FACTORY
MORRIS, N. Y.

Good News FOR OPERATORS AND STRIPPING CONTRACTORS!

NEW CARRIMORS* ASSURE EVEN LOWER STRIPPING COSTS

Whether your stripping operations call for moving a small section or several hundred thousand yards of overburden, experience proves that you can often save time, manpower and equipment by handling the entire job with LaPlant-Choate "Carrimor" scrapers. You'll find this especially true with the improved models now available because they have been re-engineered from the ground up to give you easier loading, improved "grade-ability," plus faster, cleaner dumping under all conditions. Moreover, there's a LaPlant-Choate "Carrimor" for every need and budget — from the husky 8- and 14-yard outfits, to smaller 2- and 4-yard models designed for use with crawler type or high-speed, rubber-tired industrial tractors.

Why not save the expense of *separate* loading and hauling rigs and eliminate costly re-handling of overburden by doing your complete stripping jobs with *one-man-operated* "Carrimors." See your LaPlant-Choate distributor for the complete story — today!

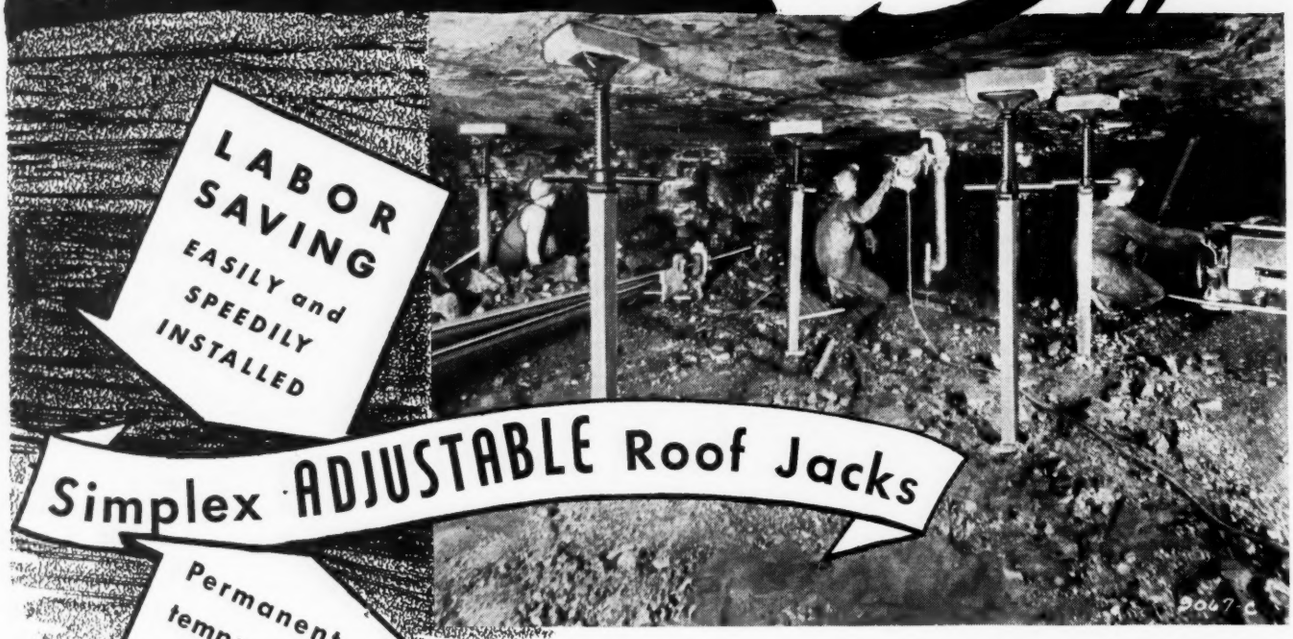
LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; Oakland, California.

*Reg. U. S. Pat. Off.

LaPLANT-CHOATE

Job-Proved Equipment... for Lowest Possible Cost in Moving Earth

SOFT ROOFS *made* Safe



LABOR SAVING EASILY and SPEEDILY INSTALLED

Simplex ADJUSTABLE Roof Jacks

Permanent or temporary support of roofs, cross timbers, steel beams and rails.

MORE WORKING SPACE *with Strength and Safety!*

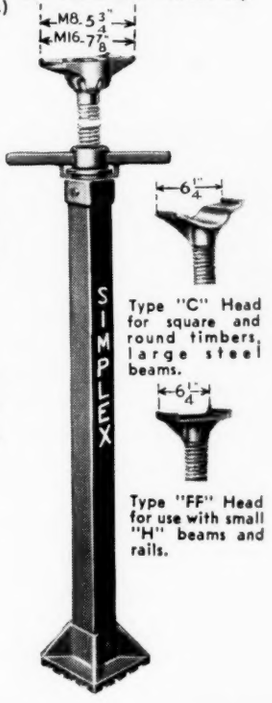
Trim and slim—no wasted girth—more space for loading machines and conveyors to work in—*yet safer* than wood posts many times their size. Both M-8 and M-16 types have heat-treated screws, 1½" and 1⅞" diameters respectively, and 2" and 2½" steel tubing respectively.

Capacity of light-duty M-8 Jack is eight tons. Heavy-duty M-16 Jacks, 16 tons capacity. Both tested for overload. Built with lever operating handle, as at right, or with combination slide and drop operating handle, and with corrugated bases and removable heads for any type of roof supporting member.

M-9 and M-17 Roof Jacks have screw base assembly only for use with standard pipe supplied by the user.

Simplex Jacks for every mining purpose . . . described in Catalog No. 45, yours for the asking. Write today.

M-8 with Lever Nut Operating Handle. Type "FS" Flat Swivel Head is drop-forged steel. (Used with wooden cap pieces.)



Type "C" Head for square and round timbers, large steel beams.

Type "FF" Head for use with small "H" beams and rails.

TEMPLETON, KENLY & CO., CHICAGO 44, ILLINOIS

HOW TO INSURE
FASTER, NON-CLOGGING
SEPARATION!

Hendrick Flange Lip Screens have staggered slots tapered in the direction of the flow, with a step at the end of each slot. This insures faster, cleaner separation as the material rolls and tumbles over the steps—without blocking or breaking in the slots.

The special slot construction of this screen is widely preferred in shaking screens for scalping, dewatering and sizing—gravity screens for sizing and scalping—and as fine removers at the discharge chutes of coal and coke pockets. Write for bulletin on Flange Lip Screens today.

HENDRICK
Manufacturing Company

Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Amorgrids.

41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

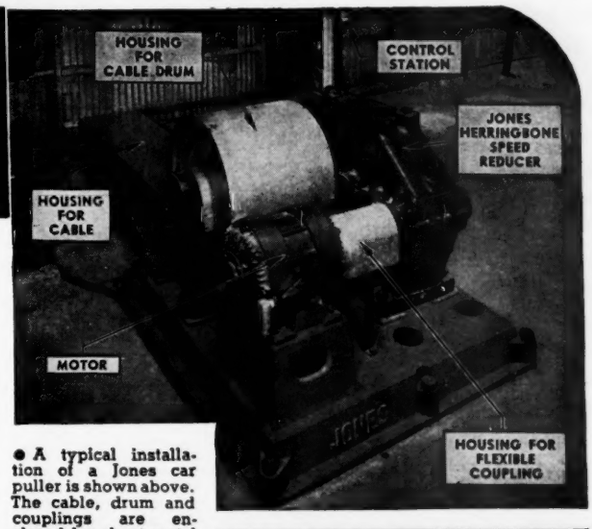
For spotting your cars-
JONES CAR PULLERS

YOU will be surprised how much time can be saved in the spotting and switching of cars by using a Jones car puller. These sturdy, compact units will speed up car handling to the point where they soon pay for themselves in the saving of time and labor.

These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

W. A. JONES FOUNDRY & MACHINE CO.
4401 Roosevelt Road, Chicago 24, Illinois



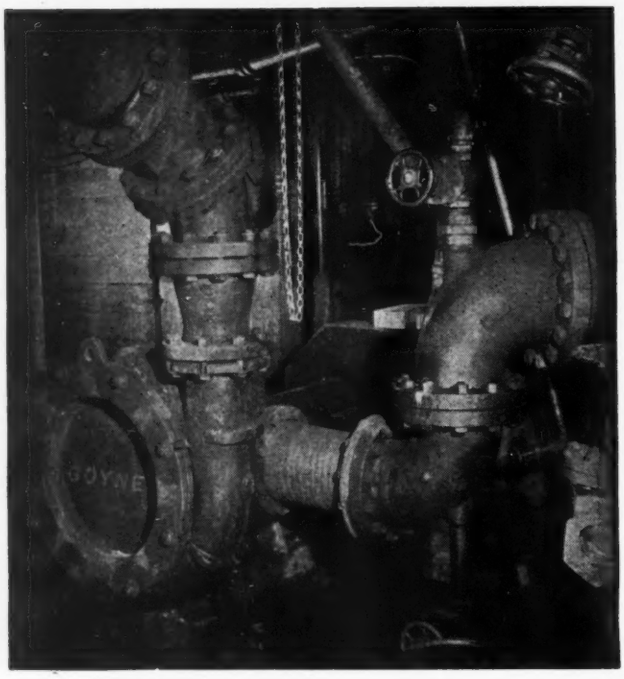
● A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

● A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
FRICTION CLUTCHES • TRANSMISSION APPLIANCES

GOYNE PROCESS PUMPS



A Sand Pump is only a link in a chain in a coal washing plant, but it can be a strong link if it embodies the following features as does the Goyne.

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing only the rear head of the pump. No suction or discharge piping is disturbed.

2. The one packing box of the pump subjected only to suction pressure and is readily kept clean by a low pressure clear water line. Long packing and shaft sleeve life is assured.

3. Impeller clearance is adjusted *while the pump is running*, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. We carry the spare parts stock. Order your replacements when needed. Reduce your inventory by using Goyne Process Pumps.

All inquiries receive prompt and careful attention.

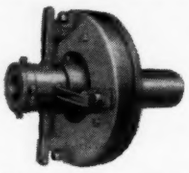
THE GOYNE STEAM PUMP CO.
ASHLAND, PA.

HAVING TROUBLE WITH YOUR DRIVE?

KINNEY CLUTCHES

CONNECT POWER PROPERLY

When you connect with a Kinney Clutch you get, at one stroke, dependable, safe and efficient power transmission. The Kinney Interchange Clutch shown picks up heavy loads smoothly and positively. Rugged and powerful, it transmits power directly through flat discs. Available in solid or split construction for easy installation. The line of Kinney Clutches is complete. Send for Bulletin K-8.



KINNEY MANUFACTURING CO.
3525 Washington Street, Boston 30, Mass.
NEW YORK • CHICAGO • PHILADELPHIA
LOS ANGELES • SAN FRANCISCO
We also manufacture vacuum pumps, liquid pumps and bituminous distributors

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications.
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
CHICAGO PERFORATING CO.
2443 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

HOFFMAN BROS. DRILLING CO.

Diamond Core Drilling Contractors
Punxsutawney, Pa. • Tel. 382

WE HAVE SPECIALIZED IN TESTING BITUMINOUS COAL LANDS FOR MORE THAN 40 YEARS

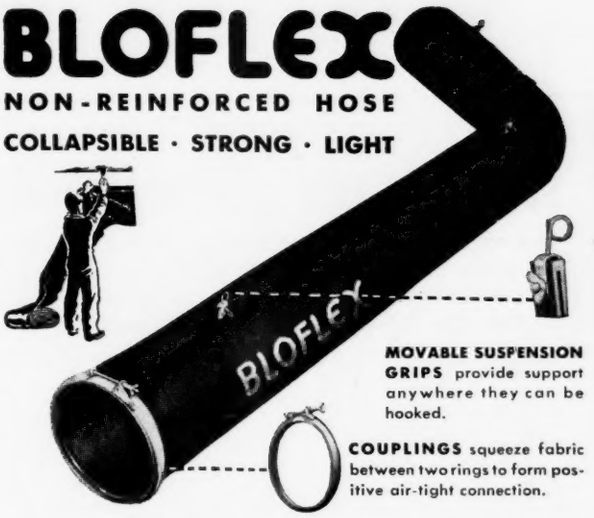
GASOLINE • STEAM • ELECTRIC DRILLS • WE PRE-GROUT SHAFT LOCATIONS • HORIZONTAL DRILL HOLES FROM 3" TO 16" FOR DEWATERING MINES • OUR OPERATORS ARE HIGHLY SKILLED

WE HAVE ALWAYS GUARANTEED SATISFACTORY COAL CORES . . . We solicit your inquiries

BLOFLEX

NON-REINFORCED HOSE

COLLAPSIBLE · STRONG · LIGHT



MOVABLE SUSPENSION GRIPS provide support anywhere they can be hooked.

COUPLINGS squeeze fabric between two rings to form positive air-tight connection.

A durable fabric tubing coated with a rubber-like compound, air-tight and moisture-resistant, for blower service only. Can be cut on the job to required lengths, and installed with air-tight couplings and movable suspension grips. No suspension wire needed. Sizes from 8″ to 18″, weighing only 36 lbs. to 90 lbs. per 100 ft. Write for full information.

Companion products for elbows, etc.

FLEXAUST
Spiral-wire-reinforced, flexible

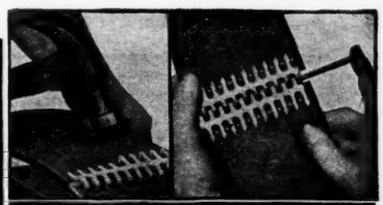
PORTOVENT
Ring-reinforced, retractable

AMERICAN VENTILATING HOSE COMPANY

15 Park Row, New York 7, New York

PLANTS: AMESBURY, MASS. • SEATTLE, WASH.

BELT LACING and FASTENERS for transmission and conveyor belts



"JUST A HAMMER TO APPLY IT"

ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

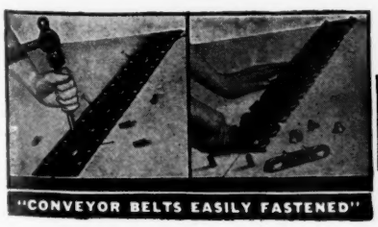
FLEXCO HD

BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses everywhere



"CONVEYOR BELTS EASILY FASTENED"

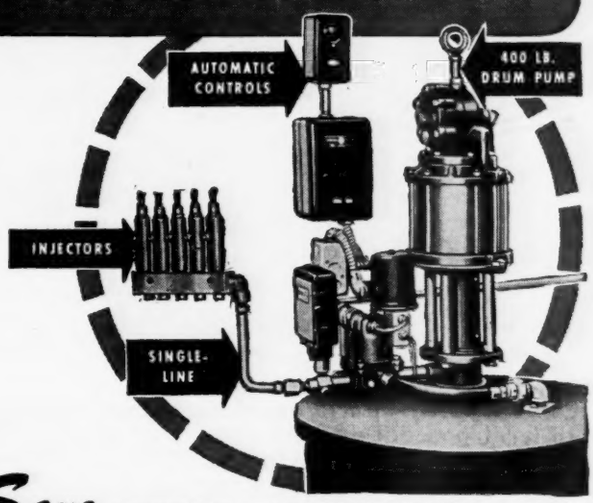
FLEXIBLE STEEL LACING CO.

4638 Lexington St. Chicago 44, Ill.

LINCOLN

Single line

CENTRO-MATIC LUBRICATING SYSTEMS



Save **BEARINGS • MACHINE HOURS • MAN HOURS • POWER—and PREVENT ACCIDENTS**

It is wise economy and sound practice to install Centro-Matic Lubricating Systems to protect the bearings on all machines. They save lubrication maintenance cost and eliminate shutting down machines for lubrication, thus permitting continuous operation. These modern systems consist of an injector connected to each bearing and a hand or power-operated pump. They are easy to install and their flexibility makes them adaptable to all types of machinery.

Model 987

Lincoln Equipment

FOR EVERY REQUIREMENT

Lincoln manufactures a full line of Industrial Lubricating Equipment and Grease Fittings. Two popular items are illustrated—The Model 987 Powerluber, an air-operated, high-pressure grease gun that dispenses lubricant direct from original 25- or 50-lb. refinery package placed in the container, or the container itself which holds 60-lbs. of lubricant. Model 1273-D is a hand-operated 30-lb. capacity high-pressure bucket pump designed for ease of operation and portability.

Model 1273-D

Write for Complete Information

LINCOLN

Pioneer Builders of Engineered Lubricating Equipment

LINCOLN ENGINEERING COMPANY, ST. LOUIS 20, MISSOURI

Please send me literature on Centro-Matic Systems ☐. *I would like to have catalog on Industrial Lubricating Equipment* ☐.

*Name*_____

*Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

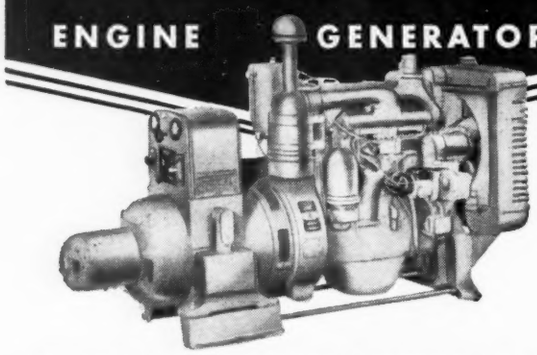
CA B46-4

Makes Electric Power Available Anywhere!

Low Cost Electricity with

READY-POWER

ENGINE GENERATORS



Powered by International Harvester Engines—Diesel, gasoline or natural gas. 7½KW to 50KW.

READY-POWER Engine Generators produce low cost electric power and permit the electrification of operations miles beyond the power lines. In many cases, important savings over central station power costs can be had. READY-POWER Engine Generators are sold and serviced by the world-wide International Harvester Power Unit dealer organization, and backed by the READY-POWER Company's twenty-two years of successful experience in producing engine generators.

THE READY-POWER CO.

11231 Freud Ave. • Detroit 14, Mich., U.S.A.

IMPROVED
SUTTON SAND DRYING STOVE

The same time tested principle for drying sand as used in Sutton STANDARD Sand Drying Stoves for more than forty years is employed in the No. 0 Sutton IMPROVED Sand Dryer.

NEW FEATURES

- PERFORATED RING of an entirely new design.
- A FIRE BOWL added between the grate and perforated ring. New type FIRE GRATE.
- ASH PIT DOOR EXTENSION to protect clean sand from ashes.
- 3/16" STEEL PERFORATED SKIRTING with clean out Doors

ECONOMY FLAME SPREADER in dome.

Catalog and Prices sent upon request.

INDIANA FOUNDRY COMPANY

950 Oak Street, Indiana, Pa.

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MINING EFFICIENCY NUMBER

are available at $1.00 each as long as the supply lasts

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If you want them for members of your staff, mail the coupon now, to

COAL AGE

COAL AGE, 330 W. 42nd St., New York

Please send us .... extra copies of COAL AGE "Mining Efficiency Number," at $1.00 per copy.
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The Cincinnati
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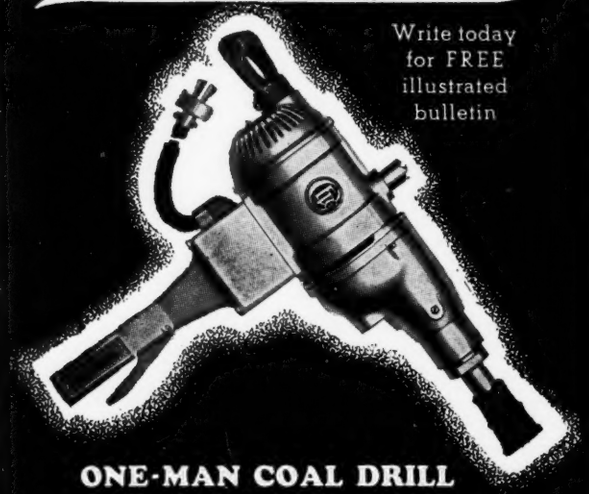
Write today for FREE illustrated bulletin



ONE-MAN COAL DRILL

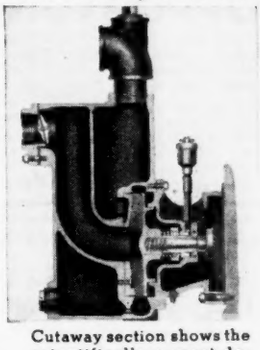
. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day". Used successfully in drilling both anthracite and bituminous coal. Easy to operate. Sold with money-back guarantee. Write today.

THE CINCINNATI ELECTRICAL TOOL CO.
Division of The R. K. LeBlond Machine Tool Co.
2635 MADISON ROAD - CINCINNATI 8, OHIO

WANTED!

TOUGH PUMPING JOBS

CARVER PUMPS are designed and built to stay on the job for hundreds of hours—always fast-priming and non-leaking—even when the water is filled with sand, silt or dirt. Mechanical seals have wearing surfaces made of tungsten-carbide—almost diamond-hard—and consequently are practically immune to wear. Impeller and suction head are also made of wear-resisting material to provide long life and efficient performance. Simple design and few working parts assure lower operating and maintenance costs. Carver self-priming centrifugal pumps are available in a wide range of capacities from 3,000 to 200,000 g. p. h. with gasoline, Diesel or electric power. Dealers in all principal cities.



Cutaway section shows the scientifically correct design of Carver self-priming centrifugal pumps.

CARVER PUMP COMPANY
Muscatine, Iowa

CARVER CENTRIFUGAL Certified PUMPS

TONGUE & GROOVE BLOCKS for safer-faster-cheaper brattice

- *Over 90% recoverable for re-use*
- *Absolutely fireproof*
- *Blocks inter-lock —no cementing*

BELOT Tongue and Groove Blocks are laid up dry, cutting labor cost in half. Blocks are fireproof and may be installed faster and easier than ordinary brattice. Write for details.

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Concrete Block Co.
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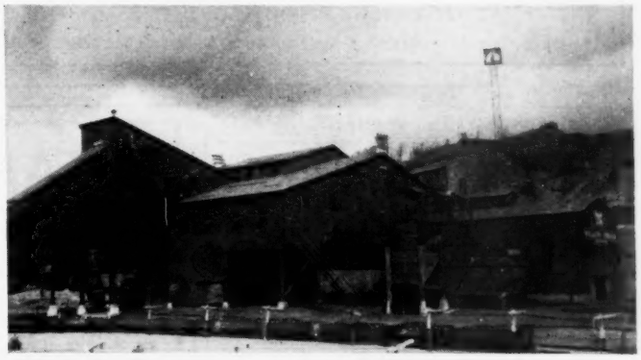
CORE DRILLING

We look into the earth

Reliable Service Since 1900

PENNSYLVANIA DRILLING CO.
1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 5816



ROOF WORN OUT?

The life of your leaky, worn roof is extended indefinitely by the application of STONHARD ROOF RESURFACER — the ideal protective surface for corrugated iron or composition.

Return this coupon for a free copy of the valuable STONHARD Roof Maintenance folder.

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Please send us a free copy of your valuable STONHARD Roof Maintenance folder.
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Mr. ..... Title .....
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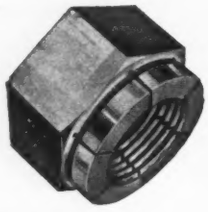
City ..... Zone ..... State .....

STONHARD COMPANY
Building Maintenance Materials
Serving the Railroads, Public Utilities and Industries Since 1922
401 N. BROAD ST., PHILADELPHIA 8, PA.



Pat'd—Pats. Pend.

A One-Piece Self-Locking NUT

FLEXLOC

That "Holds Tight"

Pat'd—Pats. Pend.

Yes . . . it's a two-in-one nut because, *all* the threads, including the locking threads, help to carry the load.

- It is of one-piece construction
- It can be made of any of the conventional nut materials
- Every thread—including locking threads—takes its share of the load
- Its construction is especially advantageous for maximum strength and dependability of low and thin nuts
- It accommodates itself to a very wide range of thread tolerances
- It can be used over and over again without losing its ability to lock
- It is not affected by temperatures likely to be met within the field of Mechanical Engineering
- Being a "stop" nut, it stays locked in any position on a threaded member

Sizes from No. 6 to 1" in diameter.

Write for Bulletin No. 582.

The Famous "Unbrako" Socket Screw Products are also made by us.

OVER 43 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

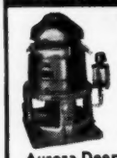
JENKINTOWN, PENNSYLVANIA BOX 738

Boston • Chicago • Detroit • Indianapolis • St. Louis • San Francisco

EXPERIENCE + SKILL + PRIDE OF PRODUCT

PUMPS "by Aurora"

AURORA CENTRIFUGAL • APCO TURBINE-TYPE



The able performance of our pumps, with high efficiency and lasting dependability, fulfills the fundamental purpose of our business. Put a PUMP "by Aurora" on that next liquids handling job. You'll LIKE IT, TOO!

NSA Aurora Centrifugal Sump Pump

Aurora Deep Well Turbines for all conditions—4" to 24"

Type AD Hor. Split Case, Two Stage Centrifugal

Type OD Hor. Split-Case Double Suction Single Stage Centrifugal

Type G M C Close-Coupled Centrifugal

Apco Turbine-Type Pumps The simplest of all pumps. Ideal for small capacity, high head duties. Silent, compact and lasting.

The ONLY MOVING PART IN the APCO

Type GGU Side Suction Single Stage Centrifugal

APCO Horizontal Condensation Return Unit

APCO Single Stage Turbine-Type

ARMY NAVY

Write for CONDENSED CATALOG M or See Our Catalog in SWEETS.

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

92 Loucks Street, AURORA, ILLINOIS

POSITION WANTED

MINE EXECUTIVE desires a connection with Bituminous producer. Graduate mining engineer thoroughly experienced in mechanical mining, construction, supervision and management. Past seventeen years as superintendent, general superintendent and general manager of mines. PW-358, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

BUSINESS OPPORTUNITIES

FOR SALE: Eastern Ohio farms, underlaid with three seams of high grade coal, suitable for drift or strip mining. Now available blocks of 100 to 1000 acres, rail and river transportation. For further information write: Frank Signorelli, Realtor, Weirton, W. Va.

LARGE ACREAGE for striping in Oak Creek District, Colorado. 12 foot vein, small parting, 14,000 btu. miles from RR., good road. Pioneer work done. BO-359, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

FOR SALE or Lease: Seven hundred acres Sullivan County, Indiana, number xi vein coal located on Illinois Central Railroad, can be operated by Shallow shaft or slope. Write R. C. Whitsett, 543 N. 7th St., Steubenville, Ohio.

FOR SALE: 1200 acres of coal land carrying the Splash Dam, Clintwood and other seams, two miles frontage on Norfolk and Western Railway. This is offered for sale or lease by me to settle an estate. W. L. Dennis, Grundy, Virginia.

FOR LEASE: 1200 acres of coal land in Buchanan Co., Va., and Pike Co., Ky., on the Grundy Branch of the N&W. RR., near Devon, W. Va. Several veins open. About 100 acres of strip coal 16 ft. 6" adjoining the Hamill Coal Co. strip mine now being operated. RR. siding, railroad siding available. Will lease on royalty. See April number of Coal Age, 1945, page 94, for discription will lease on royalty. J. M. Wolford, Cedarville, Va.

FOR SALE: only coal mine in large Wyoming county. 6' coal, Goodman cutter, mine retail yard and trucks cheap if taken together. Excellent opportunity for two or three GI's. BO-360, Coal Age, 520 N. Michigan Ave., Chicago 11, Ill.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : BUSINESS : "OPPORTUNITIES" : EQUIPMENT : USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

10 CENTS A WORD, MINIMUM CHARGE $2.00. *Positions Wanted* (full or part time salaried employment only) ½ the above rates payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $6.30 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by June 5th will appear in the June issue, subject to limitations of space available.

ASK YOURSELF FRANKLY

"WILL IT PAY

TO SELL MY BUSINESS?"

TODAY'S unusual industrial conditions may well justify you in turning your business—FOR CASH—to new management. As a reputable operating organization of long experience, with substantial capital, we can bring opportunity for increased company expansion and greater profits . . . while you are relieved of heavy expense and worry. Personnel held intact whenever possible.

ALL discussions and negotiations strictly confidential

Box 1217—1474 Bway, N. Y.

16,500 acres land with estimate of 300,000,000 tons of coal, $7.50 per acre. Also coal land suitable for strip mining. Complete details upon request.

G. B. LORRAINE

Law Bldg. Richmond 19, Va.

FOR EVERY

BUSINESS WANT

"Think Searchlight *First"*

346 Shovels
Cranes and Draglines
Including These SPECIALS
26-Yd ELECTRIC MARION
SHOVEL-*Ready for Immediate Delivery*

4-Yd. BUCYRUS ERIE

100-B 110-ft. Dragline Boom

(4 Sections) **Also 4-Yd. Shovel Attachment and Dipper Bucket. Rebuilt 1945.**

2½-Yd. LORAIN-87

Shovel-Dragline Combination

Diesel Powered. 2½-Yd. Dipper Bucket 60 Ft. Dragline Boom.

A REAL BARGAIN—$14,900.

1¾-Yd. LORAIN-80

Shovel-Dragline Combination

Built 1941. Diesel Powered.

Ready to go to work.

TWO (2) 3-Yd. MONIGHAN

WALKING DRAGLINES

Each 90-Ft. boom, Diesel Powered.

SPEED UP STRIPPING!

Put on MORE SHOVELS, DRAGLINES and HAULING EQUIPMENT—as much as the job needs to give you MAXIMUM PRODUCTION.

We'll help you with our ample listings of Equipment and our PROMPT SERVICE on INSPECTION and SHIPMENT.

Phone us "Collect" TO-DAY, and ask about our "PAY-AS-YOU-GO" PLAN.

2-YD. MACHINES

NORTHWEST Model 8—Shovel
NORTHWEST Model 7—Shovel
MARION Model 37 Shovel
LINK BELT Shovel.
OSGOOD Model 906
KOEHRING Model 703
And Five (5) Others

Phone "Collect" for Information.

ECONOMY COMPANY, INC.

49 Vanderbilt Ave., New York, N. Y. **Tels. MUrray Hill 4-2294 - 8292 - 2295 - 2296**

FOR SALE

Frank J. Wolfe

MINE CARS
400—4 ton Watt Rotary Dump Steel Mine Cars, 42" gauge, 16" Timken Bearing Wheels, height 42".

MOTOR GENERATOR SETS
1—500 KW G.E., 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC, full automatic.
3—300 KW G.E., 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC.
2—200 KW G.E.—Same as above.

ROTARY CONVERTERS
2—300 KW G.E., 275 volt DC, type HCC-8, 1200 RPM, 2300 volt transformers.

LOCOMOTIVES
6—15-ton Goodman, type 136-A, 250 volt DC, 42" gauge.
2—15-ton Westinghouse, type 908-C, 250 volt DC, 42" gauge.
4—13-ton Jeffrey MH-110, 250 volt DC, 42" gauge.
6—8-ton G.E., type HM-822, 250 volt DC, 36" gauge.
8—8-ton Goodman, type 32-A, 250 volt DC, 42" gauge.
15—6-ton Goodman, type 33, 250 volt DC, 42" gauge.

LOADING MACHINES
21—5-BU Joy, 250 volt DC.
2—#3 Myers-Whaley Automat, 250 volt DC.

CUTTING MACHINES
4—29-C Jeffrey Arcwalls, 250 volt DC.
4—29-L Jeffrey, 250 volt DC.
2—Goodman 324-AA, 250 volt DC.

TIPPLES
Several 3, 4 and 5-track Steel Tipples.

ELECTRIC HOISTS
200 to 1500 H.P.

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy. Administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING — L. D. Phone-34 — TERRE HAUTE, INDIANA

CUTTING MACHINES
2—Late type 29-C Jeffrey Arcwalls with adjustable drop bar supports and telescopic posts, 42" gage. 250 volt.
2—29-B Jeffrey Arcwalls, 250 volt, top cutters, any gage.
1—7-B Sullivan Super shortwall, 250 volt.
1—7-AU Sullivan cutting and shearing machine, 500 volt.
1—12-A Goodman, 35-HP. shortwall, with or without trucks.
1—12-AA Goodman, 50-HP. shortwall, with or without trucks.
1—112-AA Goodman, 50-HP. Universal, with or without truck.
1—CE-7 Sullivan shortwall, with or without truck.
1—35-L Jeffrey Shortwall, 220/440 volt A.C.

SUBSTATIONS
1—75-KW. G.E. M-G Set complete, 2300/4000 volt A.C. 275 volt D.C.
1—150-KW. G.E. M-G Set complete, fully automatic control.
1—200-KW. G.E. Rotary converter outfit complete with transformers and switchboards.

LOCOMOTIVES
1—5-Ton Goodman, 2600-R, 250 volt with cable reel.
1—6-ton Goodman, 30-C, 250 volt with cable reel.
1—10-Ton Jeffrey, type 66, 42 or 44" gage, 250 volt.
1—6-Ton C.E. type 700, 42" gage, 500 volt.

MISCELLANEOUS
10—Goodman and Jeffrey pit car loaders, 250 volt.
1—Sullivan Bit Sharpening machine complete with oil furnace.
1—60-HP. Fairbanks-Morse Diesel engine, 800 RPM.
200—No. 2½, 25# switches.
15000' 6/0 Fig 8 Trolley wire like new.
2500—Trolley wire hangers.
100—Trolley and feeder switches.
1—18x18" Single Roll Jeffrey coal crusher.

A.C. & D.C. Stationary Motors, Starters, Transformers, and miscellaneous mine supplies.

We solicit your inquiries

ALL-STATE EQUIPMENT CO.

LOGAN, W. VA. — *Phone 884*

MINING MACHINES

AC Ib DC

REBUILT & GUARANTEED FOR IMMEDIATE SHIPMENT

COAL CRUSHERS
Single & Double Roll
Electric Coal Drills, Mine Fans, etc.
Ironton 5-ton Storage Battery Locomotive 36" or 42" Gauge, with or without batteries
CONVEYORS—Belt and Drag
Equipment of all kinds

Buy, Sell or Exchange

THE INDUSTRIAL EQUIPMENT CORP.
(Established 1902)
705 First National Bank Bldg.
Pittsburgh 22, Pa.
Warehouse: Carnegie, Pa.

Coal Cutting Machines

3—35B Jef. 250 Volts DC permissible shortwalls.
2—35B Jef. 500 Volts DC permisible shortwalls.
2—35BB Jef. 250 Volts shortwalls.
3—35BB Jef. 500 Volts shortwalls.
2—35BB Jef. AC shortwalls.
1—124EJ Goodman Arcwall.
2—29C Jeffrey bottom cutting Arcwalls.
1—36B Jef. 250 Volts, 14" high.

Electric Locomotives

1—15 Ton GE 250 Volts, 42" gauge.
1—13 Ton GE same.
2—13 Ton GE 500 Volts.
1— 6 Ton GE, HM-823 motors.
2— 5 Ton Goodman, 250 Volts, 36" ga.

Miscellaneous

1—D13000 Caterpillar full diesel oil engine, 900 RPM, coupled to a 100 KW 250 Volt DC generator, complete.
1—150 KW Ridgway Syn. M-G Set, 250 Volts DC, any voltage AC, 1200 RPM, 80% P.F.
1—165 HP GE Syn. Motor, 2200 Volts.
1—145 HP GE Syn. Motor, 440 Volts.
1—250 HP Allis-Chalmers Sq. Cage Motor, 440 Volts, 1170 RPM.
1—Type 12½ Goodman Shaker Conveyor, complete.

TIPPINS MACHINERY CO.

Pittsburgh 6, Pennsylvania

RAILS NEW AND RELAYING

TRACK ACCESSORIES
from 5 Warehouses

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY
PITTSBURGH · CHICAGO · NEW YORK

FOR SALE
Hoists—5 HP to 150 HP.
1—Air Hoist 7½ HP.
4—Westingnouse 904—6 ton Locomotives, Bar Steel Frames, Motor driven crabs —500 volts, but can be used on 250 volts or can parallel motors—bargain price—also extra armatures.
10—Jeffrey Blowers # 60 with 1½ HP SK motors, 250 volts
1—Doodlebug Goodman Locomotive
1—29C Jeffrey Track & Caterpillar mtd. Also 2—G.E. 100 K.W. M.G. Sets—Induction motors—2200 volts—250 V.D.C. G.E.
1—Goodman Hitchcutter, 250 volt
1—Joy Room Conveyor 300' AC or DC

GUYAN MACHINERY CO.

Box 150, Logan, West Virginia

RELAYING RAIL

TRACK ACCESSORIES

MIDWEST STEEL CORP.
Gen. Off.: CHARLESTON, 21, W. VA.
Warehouses
CHARLESTON, W. VA.
KNOXVILLE, TENN. • PORTSMOUTH, VA.

RAILS — CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK

480 Lexington Ave. New York, N. Y.
Reno, Nevada
810 Park Bldg., Fifth Avenue Pittsburgh, 22, Pa.
Carnegie, Pa.

For Sale—Immediate Shipment

New API Bolted Storage Tanks

17—High 500 Bbl. Galvanized (12 gauge throughout)
14—High 500 Bbl. Black (12 gauge throughout)
81—Low 500 Bbl. Black (10 gauge shell and bottom, 12 gauge deck)
Tanks unassembled, complete with bolts, gaskets, fittings, erection tools and crated for shipment.
Location: New York State
For further information: Wire-Phone-Write

DULIEN STEEL PRODUCTS, INC.
2280 Woolworth Bldg. New York City
Tel. CO 7-4676

CALL MOORHEAD
In Pittsburgh
FOR REBUILT MINING EQUIPMENT

MINING MACHINES

1—12 DA HP 250 v. Goodman Shortwall.
12—G3 Goodman Std. 220/3/60 6' bar.
2—212 G3 Goodman AC Low Vein Shortwall.
3—35 L Jeffrey AC Low Vein.

STORAGE BATTERY LOCOMOTIVES

3—6 Ton G.E. permissible 36/44" Ga. HM 825 BB Motors. 2 with Edison Batteries. Haulage & Gathering Locomotives.
1—5 Ton Atlas 40" or 44" Ga. with 2 Ball Bearing Motors. Battery box on top of locomotive.
4 Ton 36" Ga. Atlas 2 BB Motors .
13 Ton. Jeff. MH 110, 250 v. 36/44".
10 Ton Jeff. MH 110, 250 v. 36/42".

Haulage & Gathering Locomotives

13 Ton Westgh. 250 c. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/42".
2—13 Ton G.E. 5" armorplate 500 v. 44" Ga.

COAL CRUSHERS

18 x 24 and 18 x 30 New Scottdale dbl. roll.

AIR COMPRESSORS

1300 cu. ft. 100# Pres. Worthington 2 stage Belted.

REDUCTION UNITS

500 HP Morse ratio 4.28 to 1.
250 HP Ottumwa ratio 12.7 to 7.
2—40 HP Ohio Forge ratio 45 to 1.

Rotary Con. & MG Sets (3 ph. 60 cy.)

300 KW G.E. HC 12 Rotary 275 v. 6 ph.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP.
125 KW G.E. 250 v.—190 HP G.E. I-K 440/220 v.
100 KW West. Syn. 275 v.—2300 v.
50 KW G.E. 125 v.—75 HP West. 220/440.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
500	G.E.	450	S.R.	MT 412
300	West.	1750	S.R.	CW
200	G.E.	240	S.R.	MT 412
200	G.E.	600	S.R.	I-M
100	West.	1750	S.R.	CW
100	G.E.	500	S.R.	M 1-25 cy.
100	G.E.	720	S.R.	MTC
100	G.E.	720	S.C.	I-K
60 (4)	G.E.	514	S.C.	K
50 (2)	G.E.	600	S.R.	HI
40 (3)	G.E.	600	S.R.	MT
40	G.E.	900	S.R.	MTC
20 (5)	G.E.	720	S.C.	K

SYNCHRONOUS MOTORS

HP	Make	Speed	Voltage
800	Elec. Mfg.	900	2200
150	West.	600	440/220

TRANSFORMERS

Qu.	KVA	Make	Priv. VS	Sec. V.
3	250	G.E.	22000	2300
1	50	G.E.	2400	240/460

DC Motors and Generators 230/250 V.

HP	Make	Speed	WDG	Type
175	G.E.	475	ser.	MD 109
150KW	Cr. Wh.	550	cp.	
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
100	West.	625	cp.	S
75KW	West.	1000	cp.	S
50	Reliance	1500		185T
40	Roth	1500		SK 80L
25	Wes.	875	ser.	K 5
20	West.	750		SK
15	Cr. Wh.	800	sh.	CM
15	West.	560	cp.	S
7½	G.E.	825		CC
7½	New West. Vert.	1750	sh.	SK 284
3	New G.E.	1150	cp.	B 254

HOISTS

100—HP Lidgerwood skl. fr. drum geared to 100 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC.
40 HP Lidgerwood sgl. fr. drum geared to 40 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev.
30 HP Carlin double dr. fr. 13" x 18"—5½" flgs.
10 HP Hoist sgl. fr. dr. 22" Face 12" dia. 7" flgs.

PUMPS

100 GPM 325' Head F.M. 2" suc. 1½" dis. dir. con. 15 HP F.M. 220/440 v. 3600 RPM Motor.
2—400 GPM 170' Head Lea Courtenay 4" suc. 4" Dis.
500 GPM 135' Head Janesville 4" suc. 3" dis.
700 GPM 160' Head DeLaval 6" suc. 6" dis.

MOORHEAD-REITMEYER CO., INC. **Mayflower 7900** **Pittsburgh 19, Penna.**

Serving the Coal Industry for more than a Quarter of Century

ROTARY CONVERTERS

500 KW G.E. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
500 KW AL-CH SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
300 KW G.E. SYN. 575 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 Transformers.
150 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

300 KW G.E., SYN. 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Semi-Automatic Switchgear.
300 KW G.E., SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Semi-Automatic Switchgear.
200 KW G.E. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 720 RPM, Manual Switchgear.
150 KW G.E. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.
150 KW WEST. SYN., 600 V., 2300/4000 V., 3 Ph., 60 CY., 1200 RPM, Manual Switchgear.

LOCOMOTIVES

15-T Gen. Elec. 500/250 V., 820-A Mts., 36"-42" Ga.
13-T WESTGHSE., 250 V., 908-C Mts., 36"-44" Ga.
13-T WESTGHSE., 500 V., 908-C Mts., 36"-44" Ga.
13-T GOODMAN, 500 V., 36-B Mts., 36"-42" Ga.
10-T JEFFREY, 250 V., MH-110 Mts., 36"-48" Ga.
10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 250 V., 906-C Mts., 36"-44" Ga.
8-T GEN. ELEC., 250 V., 839 Mts., 36"-48" Ga.
6-T WESTGHSE., 250 V., 903-C Mts., 30"-22" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK COMPANY
INCORPORATED
501 Grant Building Pittsburgh, Pa.

FLORENCE MACHINERY & SUPPLY CO.
DEPENDABLE USED EQUIPMENT

COAL CUTTERS

5—CE-7 Sullivan, 220 or 440 Volts AC
1—29-LE Jeffrey Coal Cutter, 250 Volts DC, mounted on Joy Cats
1—Goodman Universal, 250 Volts DC
1—Goodman Standard, 250 Volts DC

ELECTRIC HOISTS

1—200 H.P. Double Drum Shaft Hoist, with Motor & Auto. Control Panel
1—52 H.P. Single Drum, with Motor
1—25 H.P. Single Drum, with Motor
1—15 H.P. Single Drum, with Motor
1—7½ H.P. Single Drum, with Motor

LOADERS

1—7-BU Joy Loader, 250 Volts DC
1—Joy Elevating Ramp, 250 Volts DC
1—Manierre Type Box Car Egg Loader
1—Manierre Box Car Lump Loader

MISCELLANEOUS

1—30 H.P. Slip-Ring Motor, 1200 RPM, with Cont. & Grids
1—6 Ton Trolley Locomotive, 36" Ga.
1—8 Ton Trolley Locomotive, 36" Ga.
3—Double Deck Mine Cages
10—Tons 85# Rail
Plate Frogs & Switches—12# to 40#

PIT CARS

105—1 Ton R. B. Card, 36" Ga.
119—1 Ton P. B. Card, 36" Ga.

GENERATORS

1—15 KVA Ft. Wayne, 480 Volts AC
1—96 KW, 2300 Volts AC, direct connected to a 14x17 Chuse Engine
1—25 KW Crocker Wheeler, 250 Volts DC
1—100 KW Hertner, direct connected to a 150 H.P. 440 Volt Syn. Motor
1—100 KVA West. Syn. Motor, 2300 Volts AC

PUMPS

1—3x3 Deming Oil-Rite, with 3 H.P. Motor
1—5x5 Deming Oil-Rite, with 5 H.P. Motor
3—3x4¼ Goulds Pyramid, with 1½ H.P. Motors
1—4x3 Allis-Chalmers Cent. Motor Mounted, 300 GPM, 170' Head

TRANSFORMERS

1—3 KVA G.E., 550-110/220
1—5 KVA West., 440-110/220
1—7½ KVA G.E., 1150-2300-115/230
1—10 KVA Gregory, 440-110/220
3—50 KVA G.E., 13200-12000-230/460
3—100 KVA West., 13800-460/230/115

We have a complete stock of practically everything
Write for Stock List No. 8

904 EQUITABLE BLDG. **DENVER 2, COLORADO**
Yards: Denver & Florence

FOR SALE

1—GE-7 Sullivan Shortwall Machine 220 Volts D.C.
1—56 KW. M.G. Set 250 Volts D.C. 220 Volts A.C.
1—2 in. Centrifugal pump, 115 ft. head, 220 Volt A.C.

KNICKERBOCKER-McSPARIN COAL CO.
Carrier Mills, Illinois

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton 13" to 56" Track Gauge

GREENSBURG MACHINE CO.
Greensburg, Penna.

REBUILT MINING EQUIPMENT

DOUBLE DRUM HOIST

1—50 HP Lidgerwood Double Drum Hoist, drums 24" x 24", good for 5000# RP and 4000 ft. of ½" rope, motor driven

MOTORS - GENERATORS - TRANSFORMERS

JOHN D. CRAWBUCK CO PGH. (12) PA.

LOCOMOTIVES

Goodman: All 250 volts.
1—6 ton, 30B, 43" 1—5 ton.
1—5 ton, W-1-2, 36".
2—5 ton, 2600 K.
2—6 ton, 33-1-4-T.
2—8 ton, 32-1-4-T.

Westinghouse: All 250 volt.
1—4 ton, 902, 48" with crabs.
4—904 c. 44" 500 volt and 250 volt. Also 906 motors and 102-904-115.
Bar steel frames 10 ton, 6 ton, and 4 ton.

G.E.: All 250 volt 4 ton 1022, 44", as is
6 ton 803, 44" as is 5 ton 825, 44" & 36-
6 ton 823, 44" 8 ton 839 motors
6 ton 801
8 ton 839
Battery Locomotive G.E., Ironton, Atlas. Whitcomb and 1½ ton Mercury.

Jeffrey: 6 ton and 4 ton, all gauges, 250 volt 8 ton, 250 and 500 volts, 10 ton, M1178—13 ton MH110, 500 volts.

MINING MACHINES

Jeffrey: 35B and 4—28A, 250 V. 4—29B, 29C, 29CE with shearing head. Also 1 on cats. Revolving head for 29C.
35BB **Jeffrey** mining machines.
1—35 BB AC 220 volt.

Goodman: 12A, 12AB, 12AA, 12G3A, 24B.
1—12G3 220 volt and 2—142 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA.
2—124 E J.
Motors for 212AA, both 250 and 500 v.

Sullivan: CE7, CE9, CE10, CR10 Low Vein. CR5 for middle cutting.

SUBSTATIONS—275 volts, D. C.

2—150 KW **West.** Rotary.
1—200 KW 1—100 KW **Ridgway** M-G Sets.
2—100 KW **G.E.** Rotary.
1—200 K **Westinghouse** M-G Set 900 RPM, 2300-270 volt.
1—100 KW **Westinghouse** M-G Set.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 2600 K and R, 12AB, 12AA, 33-1-4-T, 31-1-4-T, 32-1-4-T, **General Electric** 801, 803, 807, 819, 821, 825, 839. **Westinghouse** 904, 905, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse** Rotary Converter Armature, 250 V Bracket Type, 150 KW G. E., HCC Bracket Type, and 150 KW G. E., TC Pedestal Type. **Sullivan** CE6, CE7, CE9 and CE10.

AERIAL TRAMWAYS • HOISTS • PUMPS • MOTORS • TRANSFORMERS • BOND WELDERS • RESISTANCE • COMPRESSORS • DUMPS • SPEED REDUCERS • FIELD FRAMES • ARMATURES • GOODMAN HYDRAULIC SHOVELS • MOTOR STARTERS AND CONTROLLERS—AC & DC • DROP BAR SUPPORTS (Gooseneck), 29B and 29C • MINING MACHINE TRUCKS • SWITCHBOARDS • CIRCUIT BREAKERS—AC & DC • COAL CRUSHERS (double roll) 12"x16", (single roll) 24"x36", 24"x24" • LATHES, SWITCHES • AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps • MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps • HOISTS, overhead, AC 3-60-440 1 ton and 2 ton • 1 clam shell bucket 1¾ cubic yard • MINE CARS • 2 SULLIVAN BIT SHARPENERS • R. R. SWITCHES 85# to 100# GENERATORS DC 250-275 volt, 30 KW to 100 KW. Also SPARE MOTORS DC and AC for mining machines and locomotives. BELT CONVEYORS, SLATE, LARRY, 2—14BU Joy Loaders, 250 v. on Cats. 2—5BU on Cats. 1—8BU on Cats. 2—Myers-Whaley, #3 and #4 Automatic and other loaders. DIESEL POWER PLANTS, 50 KW to 250 KW.

GUYAN MACHINERY COMPANY, Logan, W. Va.

MINE HOISTS

1—Thomas 24" dia. Drum with 50 H.P. Motor & Control
1—Ottumwa 36" dia. Drum with 75 H.P. Motor and Control.
1—Wellman, Keyed Drum, 60" Dia. will coil 4500 ft. 1" rope, 200 or 300 H. P. Motor with Magnetic Control.
1—Vulcan, Shaft Hoist, 72" Dia. Suitable 300 ft. Shaft. Motor with control to suit requirements.
1—Nordberg, Shaft Hoist. 72" Dia. Suitable 200 ft. Shaft. 150 H.P. Motor with Control.
1—Vulcan, Cylindro-Conical, Shaft Hoist. Drum 7'-9' Dia. Suitable 350 ft. Shaft. 400 H.P. Motor with Control.

Other Hoists Available to suit all mining conditions.

JONES MINING EQUIPMENT CO.
Empire Building, Pittsburgh 22, Pa.

RAILROAD CARS

(Standard Gauge)

Prompt Shipment

180—50-Ton All-Steel Twin Hopper Cars. Cast Steel Side Frames.

77—50-Ton All-Steel Side Discharge Hopper Cars. Cast Steel Side Frames.

IRON & STEEL PRODUCTS, INC.
41 years' experience
13484 S. Brainard Ave.,
Chicago 33, Illinois
"*ANYTHING* containing IRON or STEEL"

WESTINGHOUSE

TYPE SK—MOTORS
America's Best Stock
WIRE INQUIRIES COLLECT

MOTORS, GENERATORS, TRANSFORMERS BOUGHT & SOLD

For prompt action, wire specifications collect
ELECTRIC EQUIPMENT CO.
63 Curlew Street • Box 51 • Rochester 1, N. Y.

ROTARY CONVERTERS

(Available Soon)

Several 500 and 1000 Kw, 600 volt DC, both G.E. and Westinghouse pedestal type, 6 phase, 60 cycle, 900 and 1200 rpm; with transformers and switchboards (automatic and manual). Well maintained and attractively priced. Can be inspected in operation.

OTHER MATERIALS

New and rebuilt AC & DC motors in stock; also control; 100 and 200 Kw rotary converters; 7 x 7" 1-R Air Compressor (with or without 42" gauge track wheels); 5 ampere watthour house meters; West. AC type CO inverse time overload relays; knife switches; safety switches; disconnect switches; oil circuit breakers, etc.

Better Known . . . Known to be Better

R. H. BENNY EQUIPMENT CO.
5024 Montgomery Rd., Norwood 12, Ohio

FOR SALE

WIRE and CABLE

4,540 Ft. 600,000 CM Wire, R. C., Basket Weave
14,714 Ft. 350,000 CM Wire, R. C., Basket Weave
11,270 Ft. 300,000 CM Wire, R. C., Basket Weave
14,843 Ft. No. 4, Stranded Wire, R. C., B. W.
13,378 Ft. No. 2, 3/C Wire, R. C., Basket Weave
5,010 Ft. 4/0, 3/C Wire, R. C., Basket Weave
13,667 Ft. No. 10, 2/C Wire, R. C., Basket Weave

Other sizes in stock, send your inquiries to

GLAZER STEEL CORPORATION
610 Chamberlain St., Knoxville, Tenn.
Phone 3-0738

FOR SALE

Goodman Shaker Conveyor

Type G20-B-77; Shop No. 2675; 230 Volt DC; 2 drive troughs; 25 standard troughs and 1 duck bill.

Sullivan Mining Machine

Type 10-B; Shop No. 111353; 230 Volt DC; Bowdil cutter chain.

SURMI MINES, INC.
535 Ford Building
Great Falls Montana

For Sale — Immediate Shipment

New Aluminum Storage Tanks

1,000 bbl. (41,726 gal.) Bolted-Vertical
Inside Dimensions 8'0-½" high x 29'0-⅝" dia.
Metal Thickness .156" Throughout
Complete with spare parts. Two sets of field erection tools.
Weight Crates-Approx. 12,000# each
Necessary Erection Blueprints will be furnished.

DULIEN STEEL PRODUCTS, INC.
2280 Woolworth Bldg. New York City
Tel. CO 7-4676

AIR COMPRESSORS:
12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

RUBBER CONVEYOR BELTS:
1000', 60", 600', 30", 300', 20", 1000', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14".

ELECTRIC LOCOMOTIVES
15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:
12—100, 150, 180 & 480 KW.

MINE LOADERS:
17—GD9, Eimco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS
30—8000, 10,000 & 20,000 gallon capacity.

SHOVELS—DRAGLINES:
7—1 yd., 1½ and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

R. C. STANHOPE, INC.
60 E. 42nd Street New York 17, N. Y.

FOR SALE

Used Mine Car Trucks 44" and 48" Gauge Timken and Hyatt Bearings.

200 Used Steel Mine Cars End Dump 44" Gauge.

New 500,000 C.M. Bare Stranded Cable on Reels.

Immediate Delivery

MANSBACH METAL COMPANY
Logan, W. Va. Phone 1071

Electrical Equipment

Converters, Motor Generator Sets, A. C. & D. C. Motors, Control Equipment and Transformers.
We build equipment to fit your requirements. Over 25 years engineering background.

C. B. LOCKE CO.
P. O. BOX 3227
TEL. 38-136
CHARLESTON W. VA.

NEW and REBUILT

VIBRATING SCREENS CRUSHERS—SCALES

Immediate Shipment

3'x6'—1 deck Vibrat. Screen	$485.00
3'x6'—2 deck Vibrat. Screen	595.00
3'x8'—1 deck Vibrat. Screen	585.00
3'x8'—2 deck Vibrat. Screen	685.00
3'x8'—3 deck Vibrat. Screen	885.00
Stoker Coal Crusher	345.00
Large Stoker Coal Crusher	795.00
15 Ton Truck Scale	450.00
20 Ton Truck Scale	510.00
5 Ton Tipple Scale	175.00

BONDED SCALE COMPANY
2190 S. Third St., Columbus 7, Ohio
Phone GA 5712 Evenings UN 2832

Visit our factory. We manufacture more than 150 models of Scales, Screens, Crushers, and Conveyors. Inspect several models in operation.

For Sale—

SHASTA DAM SAND AND GRAVEL PLANT AND 10-MILE CONVEYOR EQUIPMENT

Including:
8500—36" AND 42" IDLERS.
Pulleys and Drives.
LATE MODEL 200 HP., 1800 R.P.M. GE MOTORS, complete with Starting Equipment.
Western Gear Reducers, 200 HP., 40 to 1 Ratio.
8 x 12 MARCY ROD MILL
Dorr Hydroseparators and Classifiers.
30" Tripper and Trestle.
Merrick Feedoweights and Weightometers.
All Types of Pumps, complete with Drives.
42" Pendulum Room Conveyors, 100' and 200'.
Electric Line Equipment, Transformers, Motors and Supplies.
Other Miscellaneous Contractors' Equipment.

Subject to Prior Sale
Write, Wire or Telephone Redding 1440

COLUMBIA CONSTRUCTION CO., INC.
Box 579 Redding, California

NEW
A. C. MOTORS
USED
AC & DC MOTORS

35 KWMG Set. Centrifugal Pumps

Agents

CUTLER HAMMER CONTROLS
ARMATURE & MOTOR REWINDING

UNITED ELECTRIC & MACHINE CO.
315-317 Cherry St. Terre Haute, Ind.

For Immediate Delivery

1—680 KW NORDBERG UNAFLOW Engine Generator SET: Left hand, non-condensing, 3/60/440.
1—750 KW NORDBERG Corliss Engine Generator SET: non-condensing, 3/60/440.
1—27 Ton Standard Gauge, Baldwin Saddle Tank LOCOMOTIVE.
1—62 Ton American-Consolidation Standard Gauge LOCOMOTIVE, ICC.
14 MILES RAIL.

Machine Shop, Blacksmith Shop, Motors, Tools, Supplies, etc.

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Send for Printed Circular

NEWBERRY MANUFACTURING CO.
P. O. Box 295 Newberry, Michigan
Telephone Newberry 16

FOR IMMEDIATE DELIVERY OF RUBBER PRODUCTS

Conveyor Belting...Transmission Belting...Elevator Belting...Fire, Water, Air, Steam, Suction or Welding Hose, etc.

CALL, WIRE or WRITE
CARLYLE
THE RUBBER HEADQUARTERS

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
24"	5	1/8"	1/32"
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Inquire For Prices - Mention Size and Lengths

ENDLESS "V" BELTS

"A" WIDTH All Sizes | "D" WIDTH All Sizes
"B" WIDTH All Sizes | "E" WIDTH All Sizes
"C" WIDTH All Sizes | Sold in Matched Sets

Inquire For Prices - Mention Size and Lengths

PROTECT THAT PLANT
FIRE HOSE

APPROVED SPECIFICATION HOSE
EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2½"	50 feet	$28.00
	25 "	16.00
2"	50 "	23.00
	25 "	13.00
1½"	50 "	20.00
	25 "	11.00

Specify Thread On Couplings

SPECIAL OFFER . . . HEAVY DUTY
RUBBER HOSE

WATER HOSE
Each Length with Couplings Attached

I.D. Size	Length	Per Length
¾"	25 feet	$4.25
1"	50 "	8.00
	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
	50 "	20.00	3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

CARLYLE RUBBER CO., INC.
62-66 PARK PLACE NEW YORK, N. Y.

DIESEL POWER PLANTS

1—150 K.W. with 216 HP Engine 250 Volts D.C.
1—125 K.W. with 180 HP Engine 280 Volts D.C.
1—60 K.W. with 50 HP Engine 250 Volts D.C.
1—50 K.W. with 75 HP Engine 250 Volts D.C.
1— 187 HP Engine
1— 100 HP Engine

OTHER EQUIPMMENT

2—100 K.W. GE Motor Generator Sets 250 and 500 Volt; 2200 volt Industion Motors.
1—13-ton Jeffrey MH-110 Locomotive, 500 Volt, cast iron frame.
1—10-ton Jeffrey MH—78 Locomotive, 500 Volt, cast iron frame.
4—#904 Westgh. Locomotives, 500 Volt.
Jeffrey and Goodman Pit Car Loaders.

GUYAN MACHINERY COMPANY
Box 150 Logan, West Virginia

LATHES

36" x 18' Putnam Grd. Hd. Q.C. Lathe.
36" x 24' Putnam Grd. Hd. Q.C. Lathe.

RADIAL DRILLS

6' American Triple Purpose, M.D.
6' Cincinnati Bickford Radial M.D.
7' Cincinnati Bickford Radial M.D.
5' American Triple Purpose Plain.

CINCINNATI MACHINERY & SUPPLY COMPANY
218 E. Second St., Cincinnati, Ohio

FOR SALE

HOISTS

1—Ottumwa Electric hoist, single rigid-cylindre-conical drum, with automatic control. Weight of cage 7000#, weight of car 2500#, weight of coal 6000#, lift 310', diameter of rope 1¼". Diameter of drum 60"x84". Brake, 84" diameter, 8" face, post type, oil operated. Drum shaft bearings 10"x20". Hoist is equipped with single reduction gears 19 and 229 teeth, 2½ D.P. 11" face. The drum has five grooves on the 60" diameter, 11 grooves up the cone, 4 grooves on the 84" diameter. The drum has a rope capacity of 325 feet plus three dead turns. The hoist is equipped with a 200 HP motor.

1—Ottumwa Iron Works single drum hoist. Width of drum 28", height of flange 5", diameter of drum 39", teeth in pinion gear 16, teeth in drum gear 86. Connected by flexible coupling to Ottumwa Iron works speed reducer, size SF-11, #R-220 which in turn is connected by flexible coupling to a 60 HP General Electric slip ring motor model #93E200 GI type MTC 5536, form BL, 220/440 volts, 3 phase, 60 cycle, 900 rpm, $5282160. Complete with reversible controller and resistance.

MINING MACHINES

1—Goodman Universal Shortwall mining machine, 112DB, DC, 250 volts, Cincinnati Duplex chain, 6' cutter bar. Has new extra armature. 36" or 42" gauge.

3—Goodman Longwall mining machines, DC, 36" or 42" gauge.

6—Jeffrey 35A Shortwall mining machines, 50 HP motors, 250 volts, DC. 6' cutter bars, 36" or 42" gauge.

2—Sullivan CH-11 Shearing Machines, 250 volts, DC. 7 ft. cutter bars, 36" or 42" gauge.

1—Sullivan CH-11 Shearing machine, AC, 220 volts, 3 ph, 60 cy, 7 ft. cutter bars, 36" or 42" gauge.

1—Sullivan CE-7 Shortwall mining machine, AC, 220 volts, 3 ph, 60 cy, tip-turn truck, 7 ft. cutter bar, 36" or 42" gauge.

2—Sullivan Longwall mining machines, AC, #2991, #7061.

1—Sullivan CR3 Shortwall Cutting Machine 250 volts DC. Late style rope type machine complete with electric cable and reel.

LOCOMOTIVES

3—Goodman 5 ton locomotives, type W1-2A5, 36" or 42" gauge. One is complete with electric reel.

2—Goodman 6 ton ball bearing locomotives, type 3314T, 36" or 42" gauge.

BOX CAR LOADER

1—Ottumwa new type box car loader. Will load coal from tipple into box car.

STEEL TIPPLES

1—Tipple and shaker constructed by Allen and Garcia Company. Capacity 3000 tons daily.

Have new and second hand rails and track accessories.

COAL TREATMENT PLANT

1—Viking Hot Vapor Dust Control Unit. Capacity 75 tons per hour equipped with CP 200-20 pump. Has an oil tank of approximately 320 gallon capacity.

We are distributors for John A. Roebling Sons Company wire rope and fittings.

GAVENDA BROTHERS

CANTON, ILLINOIS

FOR SALE

In Part or Whole

All right of way buildings, tanks, fences, machinery, stores and supplies of the

Yosemite Valley Railway

in Liquidation

The 78-mile Yosemite Valley Railway is for sale.
The equipment, modern and well maintained, includes:

7 LOCOMOTIVES

including:

2 locomotives, American Type 4-4-0 Saturated. Weight 114600 lbs. Tractive power 18720 lbs.

2 locomotives, Mogul Type 2-6-0 Saturated. Weight 143000 lbs. Tractive power 28600 lbs.

3 locomotives, Mogul Type 2-6-0 Superheater. Weight 143000 lbs. Tractive power 28600 lbs.

63 Freight cars including 44 40-Ton steel twin hopper center dump steel gondolas; 16 flat cars; 3 stock cars. 1 40-foot steel baggage and postal car

5 passenger cars.

1 locomotive Crane, 18 ton American Hoist and Derrick, 8 Steel Bridges, Work Equipment, Shop Machinery (Lathes, Drill Presses, Air Compressors, etc.). Bridge and Building Tools, Woodworking Machines, Fuel and Water Service Equipment, Water & Fuel Oil Tanks.

All items offered subject to prior sale.

A catalog, listing all stock machinery and supplies offered for sale, will be supplied on request. Write or wire

Yosemite Valley Railway *in Liquidation*
Merced, California

FOR SALE

1 Steel Tower for power line
1 Pile Driver, steam or air
1 Myers-Whaley Loader
1 Joy Chain Conveyor 20" x 300' DC or AC
2 Sullivan Bit Sharpeners
1 Diamond Bit Sharpener
2 100 K.W., GE M-G Sets—2300, 250-275 or 500 volts.
1 Goodman Hitch Cutter for boring for cross headers.
10 Jeffrey 12" Vent Tube Blowers.

GUYAN MACHINERY COMPANY
Box 150 Logan, W. Va.

TOP CUTTING MACHINE

1—Goodman type 724 E J 250 volt, 9ft. Cutter Bar with two chains, adjustable from 35" to 77" cut.

JONES MINING EQUIPMENT CO.
Empire Bldg. Pittsburgh 22, Pa.

IRON and STEEL PIPE

New and Used

Large stocks, all sizes
attractive prices

L. B. FOSTER COMPANY
P. O. Box 1647 Pittsburgh 30, Pa.

PIPE—MACHINERY—GAS ENGINES
AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO Near Toledo

FOR SALE

100 KW GE 250v DC Generator

Complete with Switchboard.

Jeffrey Pit Car Loader—A1 Condition

Makes good Elevating Conveyor

MID-CONTINENT COAL AND COKE CO.
Sturgis, Kentucky

PIPE New & Reconditioned

ALL SIZES for ALL PURPOSES
Cut and Threaded to Your Specifications
VALVES AND FITTINGS

UNITED PIPE & SUPPLY CO. Department 110 NORRISTOWN, PA.

FOR SALE

100 Sanford Day Drop Bottom Mining Cars—36" gauge—Most of these cars in good shape—some in need of repairs—"Subject to prior sale."

WERNER LUMBER CO.
TRACY CITY, TENN.

REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SETS

1—85 KW 680 rpm. Westg. Gen. dir. con. to 220/440 v. 3 ph. 60 cy. motor.
1—75 KW 850 rpm. 250/375 v. DC type DLC General Electric Gen. dir. con. to HP 850 rpm. 220 or 440 v. 3 ph. 60 cy. West. CCL Motor.
1—30 KW 250 v. DC cp. wd. Gen. dir. con. 220/440 v. 3 ph. 60 cy. AC Motor.
1—30 KW 250 v. DC 1200 rpm. G.E. Gen. dir. con. to 2200/440/220 v. 3/60 syn. motor.
1—20 KW 1150 rpm. 250 v. Westg. Gen. dir. driven by 30 HP 1150 rpm. motor
1—15 KW 250 v. DC G.E. M.G. Set dir. driven by 20 HP 1800 rpm. 220 v. 3 ph. 60 cy. motor

MINE LOCOMOTIVE

1—5 ton Ironton Storage Battery Locomotive.

PUMPS

1—Amer. Piston Pump—5½x4½"—size 8x12.
1—48 GPM 161' hd. Roper 3" suc. 3" dis.
1—90 GPM 225 ft. head, 600 rpm. 2x2" Blackmer.
1—220 GPM 225 ft. head, 600 rpm. 3½"x3" Blackmer.
2—500 GPM Morris Machine Wks. 4" sucs. 4" dis. 123' hd. 1760 rpm.
1—2000 GPM DeLaval 170' head.
1—3000 GPM DeLaval 144' hd. 150 HP.
1—3500 GPM DeLaval 130' hd. 1450 rpm.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
400	Westg.	CW	2200	435
350	Westg.	CW	2200	900
260	Burke	EMV-65	440	600
50–60	Westg.	CW	220	1800
■50	Chand.		220/440	1800
■30	Westg.	CW	220	1160
5	Duquesne		220/440	1200

230 V. DC MOTORS

HP	Make	RPM	Type
100	West.	300/700	SK
85	West.	500	M
80	West.	490	76A
75	West.	440	M
30	Reliance	1700	
25	Reliance	850	
25	Westg.	600	SK
25	G.E.	650	MD
20	Westg.	600	M
20	Westg.	1750	SK
20	West.	975	S
20	West.	1750	SK
15	Al. Cn.	800	
15	Westg.	1700	SK
13½	Al. Chal.	700	
13	Cr. Wh.	1100	CM
10	Cr. Wh.	675	33M
10	Cr. Wh.	825	CM
5	Westg.	850	
5	Cr. Wh.	980	CM

ALTERNATING CURRENT MOTORS
3 ph. 60 cy.

HP	Make	Volts	RPM	Type
15	Wagner	440	1800	31V
10	Westg.	220/410	860	CCL
7½	Triumph	220	685	B15
75	Westg.	220/440	1800	MS
60	Westg.	220–440	1800	
50	Westg.	220	1200	CD
50	Chandeysson	220/440	1800	
40	Westg.	440	1170	CS
30	Westg.	440	900	CS
30	Westg.	220	450	CS
25	Westg.	440	1200	CS
25	Westg.	440	575	CS
20	Westg.	440	860	CS
20	Westg.	220/440	575	CS

MAGNETIC STARTERS

50—NEW, 5, 7½, 10 and 15 HP 230 v. DC Cutler Hammer drip proof Magnetic Starters.

TRANSFORMERS

1	2	1040/2080	52/104	G.E.
1	2½	2200/1100	220/110	Al. Chal.
1	10	2300/1150	220/110	Westg.
2	15	2200	220/110	Cr. Wh.
1	20	2300	110/230	Westg.
2	20	1150/2300	115/230	Maloney
1	40	2300/1150	115/230	Maloney
1	40	1100/2200	110/220	Pgh.
3	40	2100/1050	210/105	Westg.
1	150	2200/2300/2400	220/110	G.E.

1—75 KVA Scott Connected Pittsburgh Transformer, 220 v. two to three phase or three to two phase.

COMPRESSORS

2—315 CFM Ingersoll Rand portable 100# pres. driven by 105 HP Waukesha Oil Engines, 860 rpm.
1—150 cu. ft. 100# pressure National Brake & Electric Compressor direct driven by 30 HP 220 or 440 v. 360 motor with control.

DIESEL ENGINE GENERATOR SET

1—50 kw. 250 v. DC Gen. dir. conn. to 65 HP Primm Diesel Hor. Engine.

MINE FANS

6—15,000 cu. ft. Clarage Fans 10 HP motors.

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ARMATURES—Jeffrey MH-77, MH-78, MH-88, MH-110, R-5E Reel, 35-BB, 29-C, 35-L, 35-A—General Electric HM-801, HM-807, HM-822 (550V) HM-830, CY-21 Reel—Goodman 12-A and 2600, Westinghouse 905.

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1—35-B Machine on Special Low Vein Stub Axle Truck, 250V, 28½" tramming height, with 300' RC Concentric Cable.

1—JT-145 Jeffrey Traylor Vibrator AC.

1—CBS Sullivan Bit Sharpener.

2—HM-822 500V Motor Units

1—35-B Low Type Truck.

1—35-B Turn Table Truck.

1—Fig 8 Drum (at Folansbee, W. Va.).

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1—300 GPM Worthington Centrifugal Pump, at 100' Head, Bronze Lined.

1—YR-2 Westinghouse Cable Reel, 250V.

1—B-2 Jeffrey Crusher, 18x20".

1—5 HP. SK-30 Westinghouse Motor, 230V, 1100 RPM.

1—10 HP. SK-80 Westinghouse Motor, 730 RPM., 550V., Style 143853.

1—7½ HP. SK-30 Westinghouse Motor, 1150 RPM., 230V., Style 143826.

1—3 HP. Single Phase Motor, 1750 RPM., 110-220V P-10-B Century.

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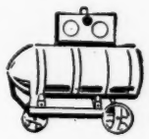

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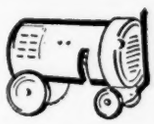

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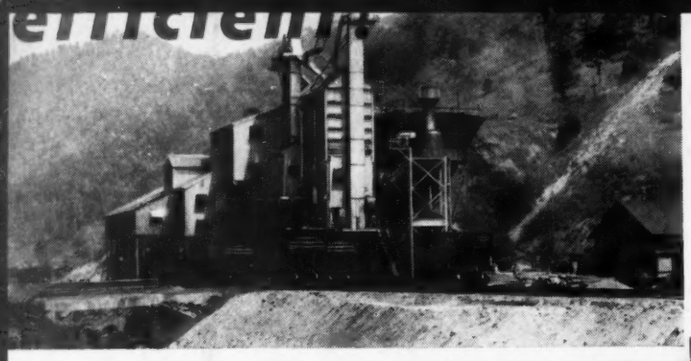
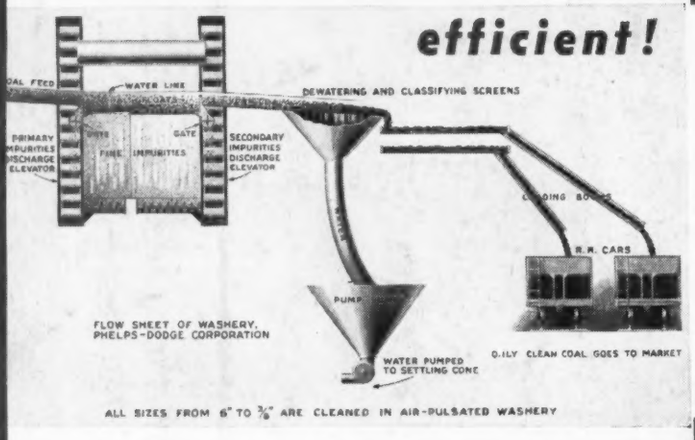


Island Creek... Holden, West Virginia

One of 3 complete Link-Belt preparation and blending plants, i clu Link-Belt air-pulsated washers at Mines Nos. 14, 20 and 22, Holde W. Each has a capacity of 500 T.P.H. of run-of-mine coal, of which a maxi of 475 T.P.H. of 5" x ¼" can be washed. After 9 years of intensive ser the plant at Mine No. 14 is being removed intact to a new mining opera for this company at their Mine No. 24.

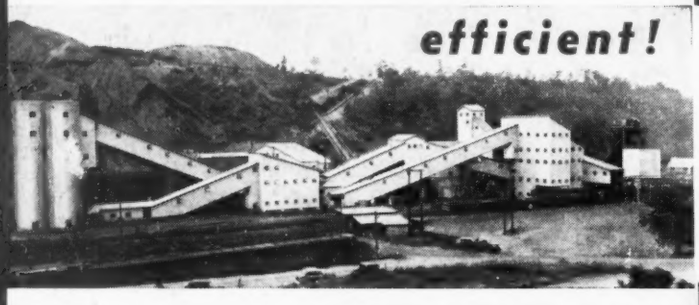
Weirton Coal Company... Isabella, Pennsylvani

This Link-Belt preparation plant, which provides complete facilities washing, blending, drying and crushing, is economically producing coa low ash and sulphur content, with uniform results — meeting the exac requirements of metallurgical work in a highly satisfactory man Capacity, 340 tons per hour.



Phelps-Dodge Corporation... Dawson, New Mexi

A Link-Belt preparation plant was recently placed in operation at the S Canon Branch Mine of this company. Its overall capacity is 300 tons hour of R.O.M. A Link-Belt air-pulsated washer cleans 250 T.P.H. minus 6" coal, which is classified after cleaning, into a number of sizes.



Alabama By-Products Corp.... Praco, Alabama

Alabama By-Products Corporation's new Link-Belt plant is in full operat preparing coal from the Mary Lee seam.

Physical blending prior to washing assures uniformity. Economi handling of mine rock, picked refuse and washer-rejects to a central d posal point. Economy in the use of water through the closed water circ of the washing system and clarification of the washery water.

Hanna Coal Company... Piney Fork, Ohio

Hanna Coal Company . . . pioneer in the washing of Ohio coal . . . selec Link-Belt preparation equipment for Piney Fork, their third Link-B preparation plant. Modern facilities embrace the dumping, conveyi washing, cleaning and drying of coal, 7" and under, and the hand-pick of larger lumps.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 19, Wilkes-Barre, Huntington, W Va., Denve Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toront

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered, Built and Backed by LINK-BELT